



Powerware® 9355 UPS
10/15 kVA
User's Guide

Class A EMC Statements

FCC Part 15

NOTE This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ICES-003

This Class A Interference Causing Equipment meets all requirements of the Canadian Interference Causing Equipment Regulations ICES-003.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

IEC 62040-2

Some configurations are classified under IEC 62040-2 as "Class-A UPS for Unrestricted Sales Distribution." For these configurations, the following applies:

WARNING This is a Class A-UPS Product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take additional measures.

Powerware, ABM, and Powerware Hot Sync are registered trademarks and X-Slot, ConnectUPS, and LanSafe are trademarks of Eaton Power Quality Corporation.

Greenlee is a registered trademark of Greenlee Textron.

Modbus is a registered trademark of Modicon.

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Requesting a Declaration of Conformity

Units that are labeled with a CE mark comply with the following harmonized standards and EU directives:

- Harmonized Standards: IEC 62040-1-1 and IEC 62040-2; IEC 60950 Third Edition
- EU Directives:
 - 73/23/EEC, Council Directive on equipment designed for use within certain voltage limits
 - 93/68/EEC, Amending Directive 73/23/EEC
 - 89/336/EEC, Council Directive relating to electromagnetic compatibility
 - 92/31/EEC, Amending Directive 89/336/EEC relating to EMC

The EC Declaration of Conformity is available upon request for products with a CE mark. For copies of the EC Declaration of Conformity, contact:

Eaton Power Quality Oy
Koskelontie 13
FIN-02920 Espoo
Finland
Phone: +358-9-452 661
Fax: +358-9-452 665 68

Special Symbols

The following are examples of symbols used on the UPS to alert you to important information:



RISK OF ELECTRIC SHOCK - Indicates that a risk of electric shock is present and the associated warning should be observed.



CAUTION: REFER TO OPERATOR'S MANUAL - Refer to your operator's manual for additional information, such as important operating and maintenance instructions.



This symbol indicates that you should not discard the UPS or the UPS batteries in the trash. This product contains sealed, lead-acid batteries and must be disposed of properly. For more information, contact your local recycling/reuse or hazardous waste center.



This symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.



ON - Indicates that the switch is in the ON position.



OFF - Indicates that the switch is in the OFF position.



PHASE - The word "phase."

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Chapter 1 Introduction

The Powerware® 9355 uninterruptible power supply (UPS) is a true online, double-conversion three-phase system that can be used to prevent loss of valuable electronic information and minimize equipment downtime. It is ideal for protecting essential information technology and electrical engineering infrastructure in corporate, telecom, health care, banking, and industrial applications.

The Powerware 9355 UPS continually monitors incoming electrical power and removes the surges, spikes, sags, and other irregularities that are inherent in commercial utility power. Working with a building's electrical system, the UPS supplies clean, consistent power that sensitive electronic equipment requires for reliable operation. During brownouts, blackouts, and other power interruptions, batteries provide emergency power to safeguard operation.

With the Powerware 9355 UPS, you can safely eliminate the effects of electrical line disturbances and guard the integrity of your systems and equipment. Figure 1 shows the Powerware 9355 UPS and an optional Extended Battery Module (EBM).

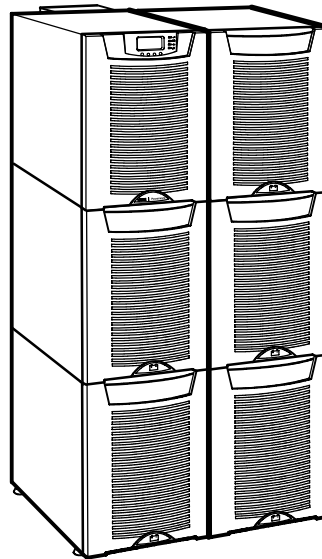


Figure 1. The Powerware 9355 UPS and EBM (3-High Cabinets Shown)

Providing outstanding performance and reliability, the Powerware 9355 UPS's unique benefits including the following:

- Online UPS design with pure sine wave output. The UPS filters and regulates incoming AC power and provides consistent power to your equipment without draining the battery.
- More wattage in less space with a 0.9 power factor – protecting more equipment and leaving more room for expansion.
- A UPS maintenance bypass switch provides a Make-Before-Break (MBB) wrap-around bypass for UPS maintenance or service without shutting down the load.
- Support for Powerware Hot Sync® paralleling of multiple modules for redundancy or extra capacity.
- Input current total harmonic distortion (THD) of less than five percent, using active input power factor correction.
- ABM® technology that uses advanced battery management to increase battery service life, optimize recharge time, and provide a warning before the end of useful battery life.
- Up to three hours of extended runtime with added EBMs.
- Advanced power management with the Software Suite CD for graceful shutdowns and power monitoring.
- Emergency shutdown control through the Remote Emergency Power-off (REPO) port.
- Start-on-battery capability for powering up the UPS even if utility power is not available.
- Standard communication options with a DB-9 serial port, relay output contacts, and programmable signal inputs.
- Optional X-Slot™ cards enhance communication capabilities for increased power protection and control.

The following options for the Powerware 9355 are available:

- **Remote Monitor Panel (RMP)**

The optional RMP provides monitoring of the operational status and alarm condition of the UPS from virtually any location within the facility. You can install multiple RMPs at remote locations to increase your monitoring capabilities.

- **Power Distribution Module (PDM)**

The optional PDM comes equipped with several different types of output receptacles.

- **Parallel Tie Cabinet**

An optional parallel system with up to four UPSs can be installed to provide a parallel capacity and/or redundant system. This load sharing system provides more capacity than a single UPS and can provide backup, depending on the load and configuration. In addition, when one UPS is taken out of service for maintenance or is not operating properly, a redundant UPS continues to supply uninterrupted power to the critical load. A parallel Powerware Hot Sync Computer Area Network (CAN) Bridge Card provides connectivity for system metering and operational mode control. The parallel system consists of two to four UPSs, each with a parallel CAN Bridge Card, and a parallel tie cabinet. Refer to the *Powerware 9355 Parallel UPS (10/15 kVA) User's Guide* for more information.

- **Wall-Mounted Bypass Switch**

The optional wall-mounted bypass switch is used to bypass the UPS during maintenance or servicing, providing wrap-around bypass for UPS service without shutting down the load.

- **Input Isolation Transformer**

The optional input isolation transformer is located at the bottom of a 3-high UPS model. The isolation transformer allows operation from a 480V or 600V 60-Hz source.

- **Seismic Kit**

The optional seismic kit secures the UPS and optional EBMs for Zone 4 seismic installations.

Chapter 2 Safety Warnings

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This manual contains important instructions that you should follow during installation and maintenance of the UPS and batteries. Please read all instructions before operating the equipment and save this manual for future reference.

DANGER



This UPS contains **LETHAL VOLTAGES**. All repairs and service should be performed by **AUTHORIZED SERVICE PERSONNEL ONLY**. There are **NO USER SERVICEABLE PARTS** inside the UPS.

WARNING



- This UPS contains its own energy source (batteries). The UPS output may carry live voltage even when the UPS is not connected to an AC supply.
 - To reduce the risk of fire or electric shock, install this UPS in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum).
 - To reduce the risk of fire, connect only to a circuit provided with 100 amperes maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.
 - Output overcurrent protection and disconnect switch must be provided by others.
-

CAUTION



- Batteries can present a risk of electrical shock or burn from high short circuit current. Observe proper precautions. Servicing should be performed by qualified service personnel knowledgeable of batteries and required precautions. Keep unauthorized personnel away from batteries.
 - Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
 - Never dispose of batteries in a fire. Batteries may explode when exposed to flame.
-

Consignes de Sécurité

CONSIGNES DE SÉCURITÉ IMPORTANTES CONSERVER CES INSTRUCTIONS CE MANUEL CONTIENT DES CONSIGNES DE SÉCURITÉ IMPORTANTES



DANGER!

Cet onduleur contient des TENSIONS MORTELLES. Toute opération d'entretien et de réparation doit être EXCLUSIVEMENT CONFIEE A UN PERSONNEL QUALIFIE AGRÉÉ. AUCUNE PIÈCE RÉPARABLE PAR L'UTILISATEUR ne se trouve dans l'onduleur.



WARNING

- Cet onduleur renferme sa propre source d'énergie (batteries). Les prises de sortie peuvent être sous tension même lorsque l'onduleur n'est pas branché sur le secteur.
- Pour réduire les risques d'incendie et de décharge électrique, installer l'onduleur uniquement à l'intérieur, dans un lieu dépourvu de matériaux conducteurs, où la température et l'humidité ambiantes sont contrôlées. La température ambiante ne doit pas dépasser 40 °C. Ne pas utiliser à proximité d'eau ou dans une atmosphère excessivement humide (95 % maximum).
- La protection contre une surintensité pour le(s) circuit(s) de sortie de courant alternatif doit être fournie par un autre fournisseur.
- Les interrupteurs de déconnexion convenables pour le(s) circuit(s) de sortie de courant alternatif doivent être fournis par un autre fournisseur.



ATTENTION!

- Les batteries peuvent présenter un risque de décharge électrique ou de brûlure par des courts-circuits de haute intensité. Prendre les précautions nécessaires.
- Une mise au rebut réglementaire des batteries est obligatoire. Consulter les règlements en vigueur dans votre localité.
- Ne jamais jeter les batteries au feu. L'exposition aux flammes risque de les faire exploser.

Advertencias de Seguridad

INSTRUCCIONES DE SEGURIDAD IMPORTANTES GUARDE ESTAS INSTRUCCIONES ESTE MANUAL CONTIENE INSTRUCCIONES DE SEGURIDAD IMPORTANTES



PELIGRO

Este SIE contiene VOLTAJES MORTALES. Todas las reparaciones y el servicio técnico deben ser efectuados SOLAMENTE POR PERSONAL DE SERVICIO TÉCNICO AUTORIZADO. No hay NINGUNA PARTE QUE EL USUARIO PUEDA REPARAR dentro del SIE.



WARNING

- Este SIE contiene su propia fuente de energía (las baterías). Los receptáculos de salida pueden transmitir corriente eléctrica aun cuando el SIE no esté conectado a un suministro de corriente alterna (c.a.).
- Para reducir el riesgo de incendio o de choque eléctrico, instale este SIE en un lugar cubierto, con temperatura y humedad controladas, libre de contaminantes conductores. La temperatura ambiente no debe exceder los 40°C. No trabaje cerca del agua o con humedad excesiva (95% máximo).
- La protección contra exceso de corriente para el/los circuito(s) de CA de salida será suministrada por terceros.
- Los interruptores de desconexión debidamente clasificados para el/los circuito(s) de CA de salida serán suministrados por terceros.



PRECAUCIÓN

- Las baterías pueden presentar un riesgo de descargas eléctricas o de quemaduras debido a la alta corriente de cortocircuito. Preste atención a las instrucciones correspondientes.
- Es necesario desechar las baterías de un modo adecuado. Consulte las normas locales para conocer los requisitos pertinentes.
- Nunca deseche las baterías en el fuego. Las baterías pueden explotar si se las expone a la llama.

Chapter 3 UPS Setup

This chapter describes:

- Equipment inspection
- Floor loading and clearances
- Unloading the cabinet(s)

The instructions are intended for the chief operator/system supervisor, electrical consultants, and installation electricians. Local regulations and electrical code must be followed during the UPS installation.

Inspecting the Equipment

If any equipment has been damaged during shipment, keep the shipping and packing materials for the carrier or place of purchase and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

To file a claim for shipping damage or concealed damage: 1) File with the carrier within 15 days of receipt of the equipment; 2) Send a copy of the damage claim within 15 days to your service representative.



NOTE *Check the battery recharge date on the packaging label. If the date has expired and the batteries were never recharged, do not use the UPS. Contact your service representative.*

Floor Loading

When planning the installation, consider the UPS weight for floor loading. The strength of the installation surface must be adequate for point and distributed loadings. The approximate weights are shown in the following table.

Standard Model Floor Loadings		
Powerware 9355	Maximum Weight (lb)	Point Loading lb/in ² (kg/cm ²)
2-High UPS	381 lb (173 kg)	95 (6.7)
3-High UPS-32	587 lb (266 kg)	147 (10.3)
3-High UPS-64	619 lb (281 kg)	155 (10.9)
2-High EBM	480 lb (218 kg)	120 (8.4)
3-High EBM	710 lb (322 kg)	178 (12.5)

Clearances

The following clearances are recommended for the Powerware 9355 UPS:

From Front of Cabinet	36" (91.4 cm) working space
From Back of Cabinet	6" (15.2 cm) without PDM installed; with PDM installed, clearance determined by customer-supplied mating plug

Unloading the Cabinet(s)

The following tools are required for unloading the cabinet(s):

- 15 mm wrench or socket
- 7 mm nut driver or socket



CAUTION

The UPS and EBM are heavy (see page 10). Unloading the cabinets requires at least two people to safely remove the cabinets from the pallet.

Three-High Cabinets

To remove a three-high UPS or EBM from the shipping pallet:

1. Remove the two M10 bolts securing the stabilizing bracket to the pallet (see Figure 2).

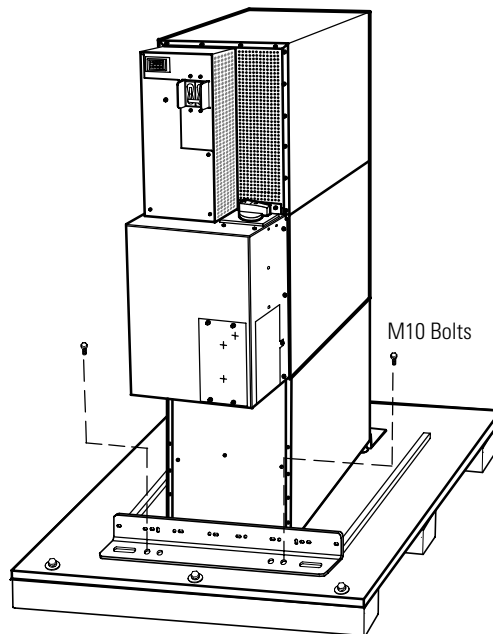


Figure 2. Removing the Stabilizing Bracket Bolts

2. Remove the four M4 screws securing the stabilizing bracket to the cabinet rear panel and remove the bracket (see Figure 3). Retain the hardware for later use.



NOTE Be sure to retain the stabilizing bracket and hardware for later re-assembly onto the cabinet.

3. Remove the three M10 bolts securing the rear shipping pad to the pallet and remove the shipping pad.



NOTE Hold the back of the cabinet so that the bolts can be removed easily without the cabinet rolling backward.

4. Remove the two M10 bolts securing the front shipping bracket and remove the bracket.

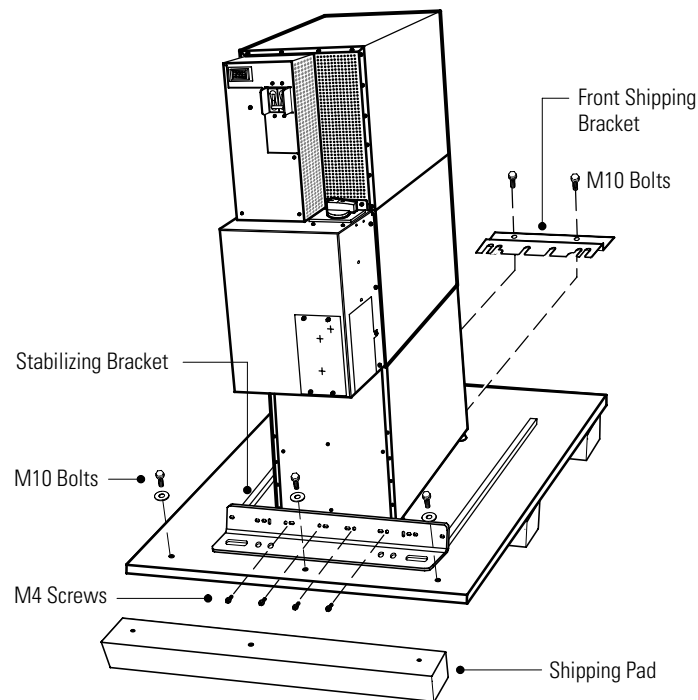


Figure 3. Removing the Brackets and Shipping Pad



NOTE Be sure to support the front and back of the cabinet when rolling it off the pallet to prevent tipping.

5. Slowly roll the cabinet toward the rear of the pallet. Once the pallet tilts, continue rolling the cabinet down the pallet until the cabinet touches the floor (see Figure 4).

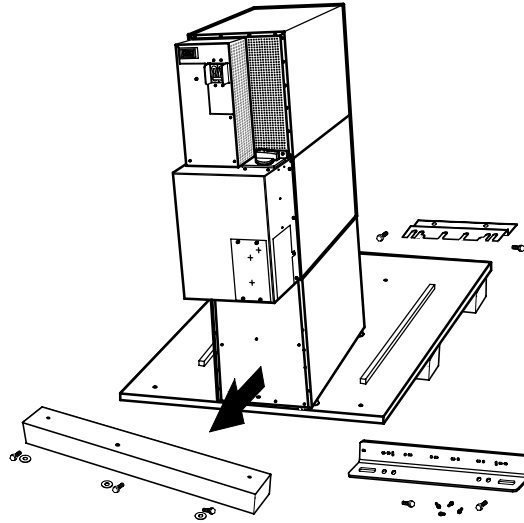


Figure 4. Unloading the Cabinet

6. With the UPS supported, slowly pull the pallet away from the UPS (see Figure 5).

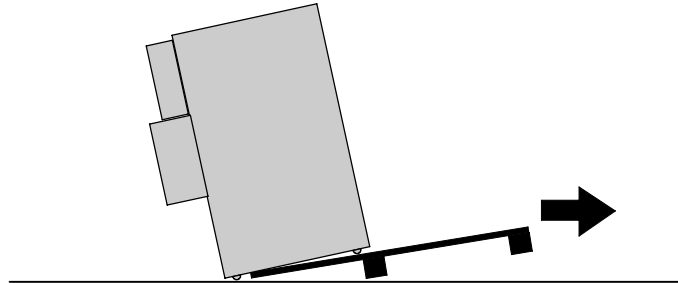


Figure 5. Removing the Pallet

7. Roll the cabinet to the desired location.
8. Continue to "Selecting an Installation Option" on page 17.

Two-High UPS Cabinet

To remove a two-high UPS from the shipping pallet:

1. Remove the M10 bolt securing the vertical bracket to the pallet (see Figure 6).
2. Remove and retain the three M4 screws securing the vertical bracket to the UPS. Remove the vertical bracket.

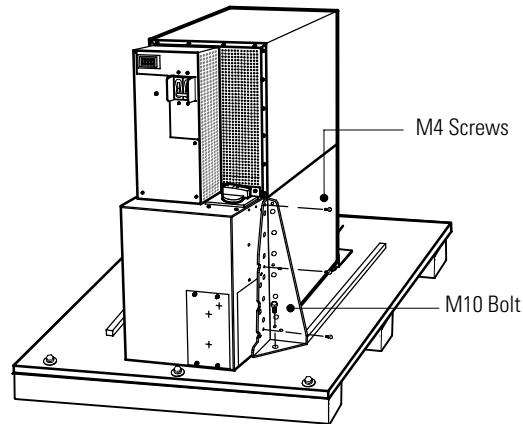


Figure 6. Removing the Vertical Bracket

3. Reinstall the M4 screws to the UPS (see Figure 7).

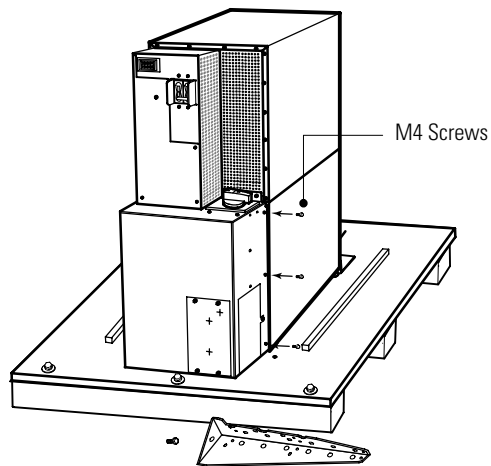


Figure 7. Reinstalling the M4 Screws

4. Repeat Steps 1 through 3 to remove the vertical bracket on the other side.
5. Remove the three M10 bolts securing the rear shipping pad to the pallet and remove the shipping pad (see Figure 8).



NOTE Hold the back of the cabinet so that the bolts can be removed easily without the cabinet rolling backward.

6. Remove the two M10 bolts securing the front shipping bracket and remove the bracket.

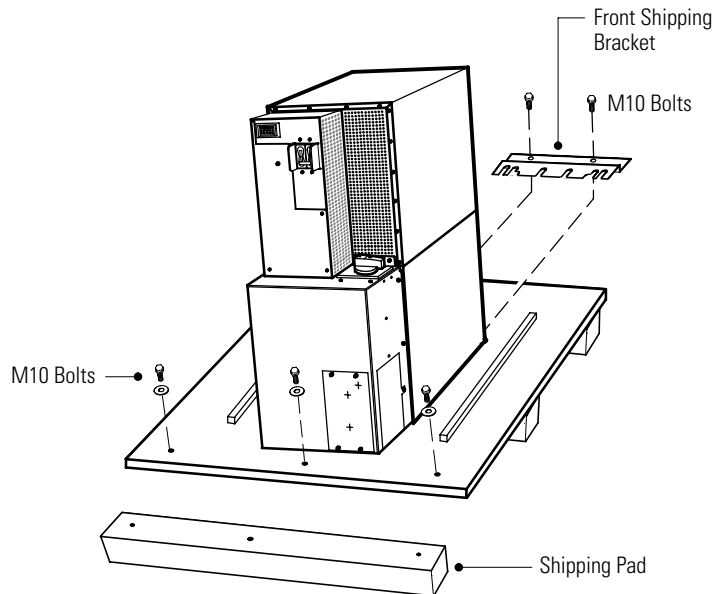


Figure 8. Removing the Front Bracket and Shipping Pad



NOTE Be sure to support the front and back of the cabinet when rolling it off the pallet to prevent tipping.

7. Slowly roll the cabinet toward the rear of the pallet. Once the pallet tilts, continue rolling the cabinet down the pallet until the cabinet touches the floor (see Figure 9).

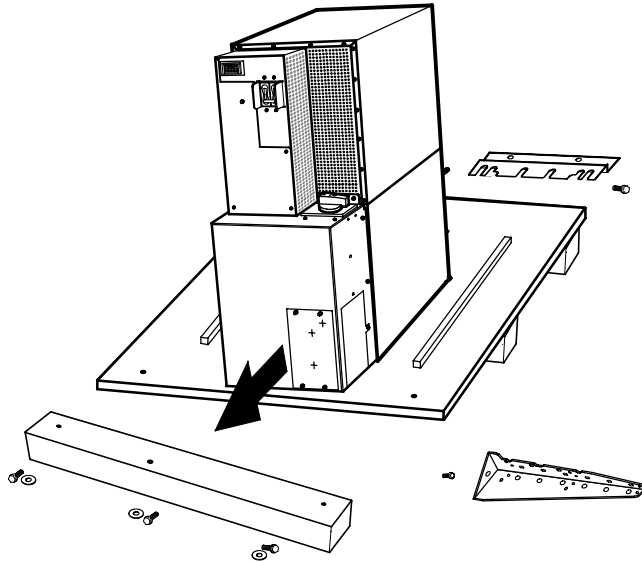


Figure 9. Unloading the Cabinet

8. With the UPS supported, slowly pull the pallet away from the UPS (see Figure 10).

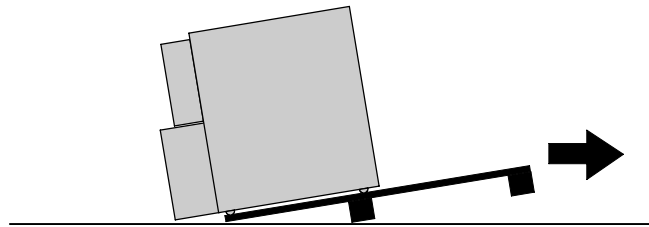


Figure 10. Removing the Pallet

9. Roll the cabinet to the desired location.
10. Continue to the following section, "Selecting an Installation Option."

Selecting an Installation Option

You are now ready to install the Powerware 9355 UPS. Select one of the following installation options according to your UPS configuration:

UPS Configuration	Installation Chapter
UPS only	Chapter 4, "UPS Only Installation" on page 19
UPS with an optional input isolation transformer	Chapter 4, "Input Isolation Transformer Installation" on page 19
UPS with an optional wall-mounted bypass switch	Chapter 5, "Wall-Mounted Bypass Switch Installation" on page 29
Parallel UPS configuration	Refer to the <i>Powerware 9355 Parallel UPS (10/15 kVA) User's Guide</i> .

Chapter 4 UPS Installation

The Powerware 9355 has the following power connections:

- 3-phase (L1, L2, and L3), neutral, and ground connection for rectifier/bypass input
- 3-phase (L1, L2, and L3), neutral, and ground connection for load output

The nominal input/output voltages are:

- 120/208 or 127/220 Vac with 120° phase displacement
- 480V or 600V 60-Hz input is available using the optional input isolation transformer module

Output overcurrent protection and disconnect switch must be provided by others.

Figure 15 through Figure 17 beginning on page 25 show the oneline diagrams.



WARNING

Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

Use the following procedure to hardwire the UPS:

1. Verify that the electrical connections to the installation site have been properly installed.
2. A wall-mounted, user-supplied, readily-accessible disconnection device must be incorporated in the input wiring.

Compare the circuit breaker ratings to the ones in Table 1 on page 22.

3. Switch off utility power to the distribution point where the UPS will be connected. Be absolutely sure there is no power.
4. Determine your equipment's grounding requirements according to your local electrical code.

5. Verify that the UPS battery circuit breaker is in the OFF position (see Figure 11).

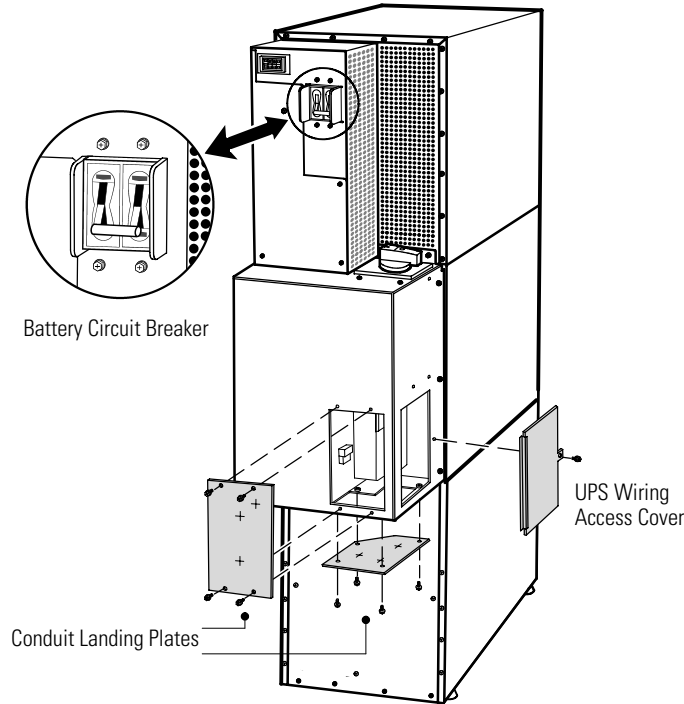


Figure 11. UPS Rear View (3-High Shown)

6. For UPS only installations, continue to Step 7; for UPS installations with an input isolation transformer, proceed to Step 10.
7. Remove the UPS wiring access cover and one of the conduit landing plates and retain (see Figure 11).
8. Punch two holes in the conduit landing plate for the input and output conduit using a Greenlee® punch or similar device.
9. Proceed to Step 12.

10. Verify that the input circuit breaker is in the OFF position (see Figure 12).
11. Remove the input isolation transformer wiring access cover and retain.

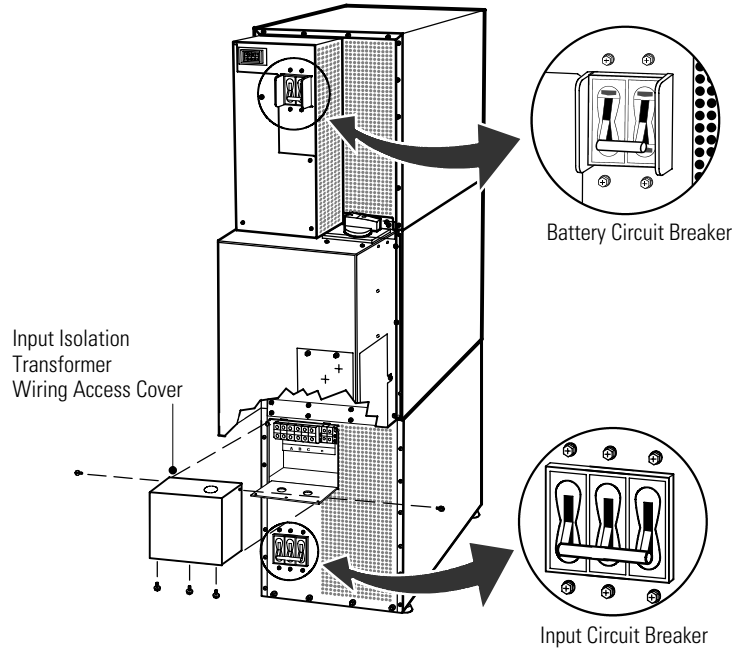


Figure 12. UPS with Input Isolation Transformer Rear View

12. Hardwire the input, output, and ground terminations for the UPS or input isolation transformer. See Table 1 for wiring specifications.

For a detailed view of the terminal block, see Figure 13 or Figure 14 on page 23.



NOTE Input neutral must be wired for proper operation. Failure to connect an input neutral will void the warranty.

NOTE The Powerware 9355 UPS is a single-feed UPS only.

Table 1. Terminal Block Wiring

10 kVA Input Voltage	Wire Function	Input Circuit Breaker Size	L1, L2, L3, N Wire Size ¹	Ground Wire Size ¹	Tightening Torque	Conduit Size ^{2,3} (Number of Conduits)
208	Input	45A	6 AWG	10 AWG	120 lb in (13.5 Nm)	1.00" conduit (1)
220		45A	8 AWG	10 AWG		
480 (with transformer)		20A	12 AWG	12 AWG		
600 (with transformer)		20A	12 AWG	14 AWG		
208	Output		8 AWG	10 AWG	120 lb in (13.5 Nm)	1.00" conduit (1)
220			8 AWG	10 AWG		
480 (with transformer)			8 AWG	10 AWG		
600 (with transformer)			8 AWG	10 AWG		
15 kVA Input Voltage	Wire Function	Input Circuit Breaker Size	L1, L2, L3, N Wire Size ¹	Ground Wire Size ¹	Tightening Torque	Conduit Size ^{2,3} (Number of Conduits)
208	Input	60A	4 AWG	10 AWG	120 lb in (13.5 Nm)	1.25" conduit (1)
220		60A	4 AWG	10 AWG		1.25" conduit (1)
480 (with transformer)		30A	10 AWG	10 AWG		1.00" conduit (1)
600 (with transformer)		25A	10 AWG	10 AWG		1.00" conduit (1)
208	Output		6 AWG	10 AWG	120 lb in (13.5 Nm)	1.00" conduit (1)
220			6 AWG	10 AWG		
480 (with transformer)			6 AWG	10 AWG		
600 (with transformer)			6 AWG	10 AWG		

¹ Use only 90°C-rated copper wire. Minimum wire size is based on 120/208 full load ratings applied to NEC Code Table 310-16. Code may require a larger AWG size than shown in this table because of temperature, number of conductors in the conduit, or long service runs. Follow local requirements.

² Per NEC article 300-20(a), all three-phase conductors must be run in the same conduit. Neutral and ground must be run in the same conduit as the phase conductors.

³ Conduit is sized to accommodate one neutral conductor the same size as the phase conductor and one #8 AWG ground conductor. If two neutral conductors or an oversized neutral conductor are to be installed, check the size of the conduit needed to accommodate the extra wire or size and use that conduit size in place of the conduit size listed. Conduit sizes were chosen from NEC Table C1, type letters RHH, RHW, RHW-2, TW, THW, THHW, THW-2.

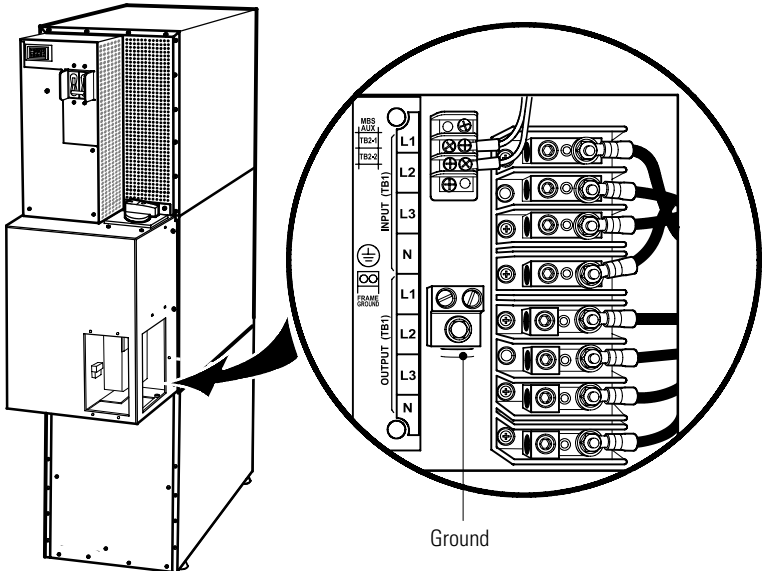


Figure 13. UPS Terminal Block (3-High Shown)

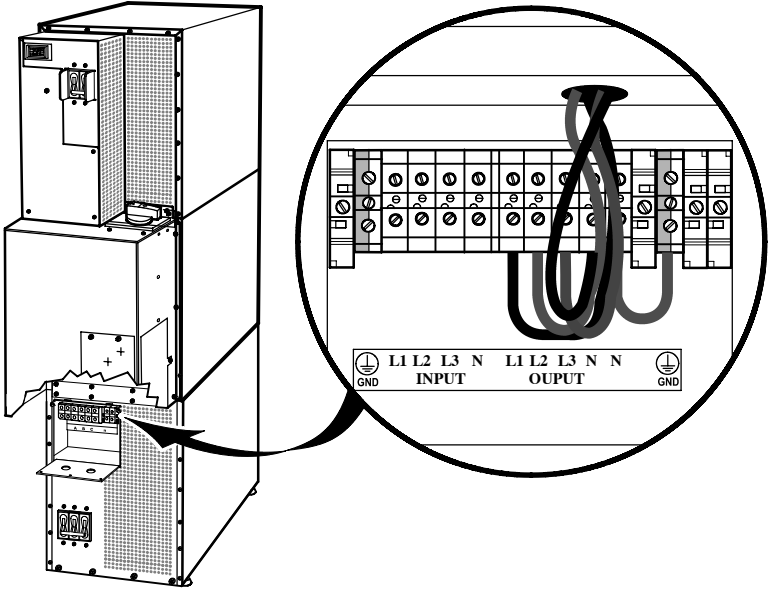


Figure 14. Input Isolation Transformer Terminal Block

- 13.** For UPS only installations, replace the UPS wiring access cover and conduit landing plate.

For UPS installations with an input isolation transformer, replace the transformer's wiring access cover.

- 14.** Continue to "Stabilizing the Cabinet" on page 39 to complete the UPS installation.

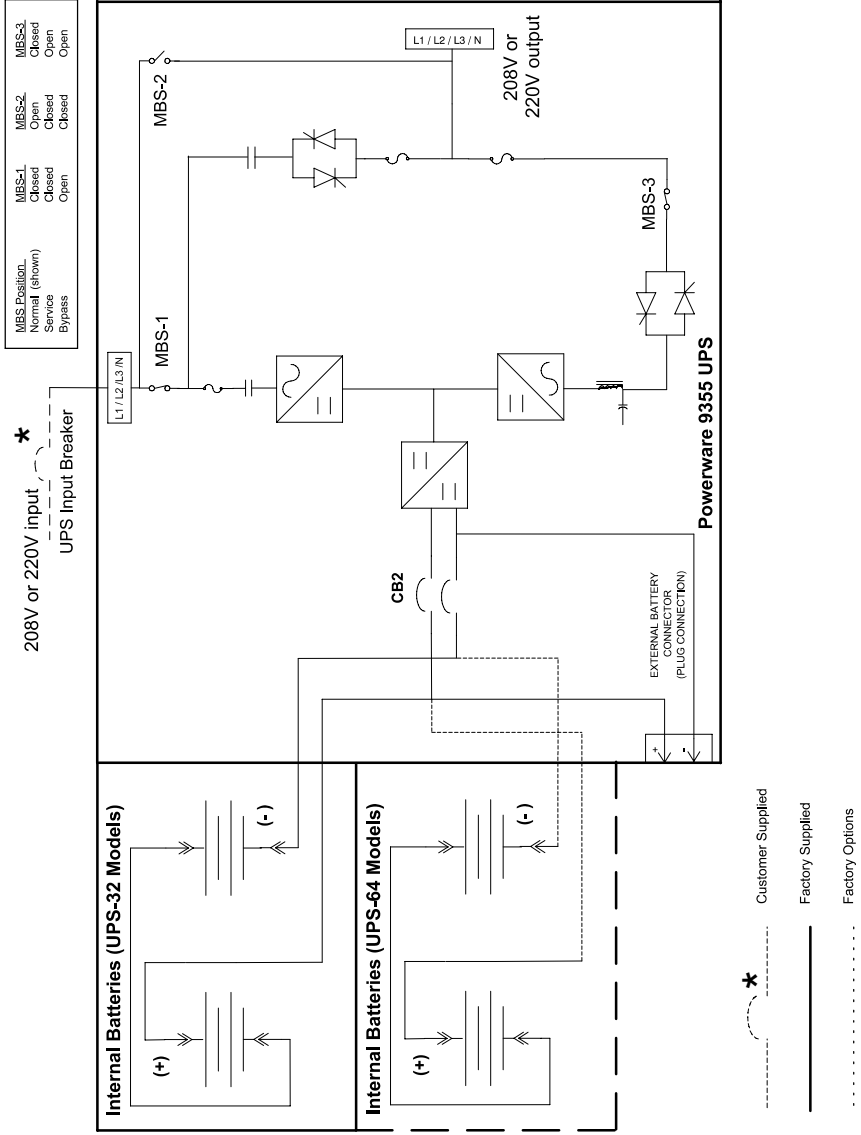


Figure 15. UPS Wiring Diagram

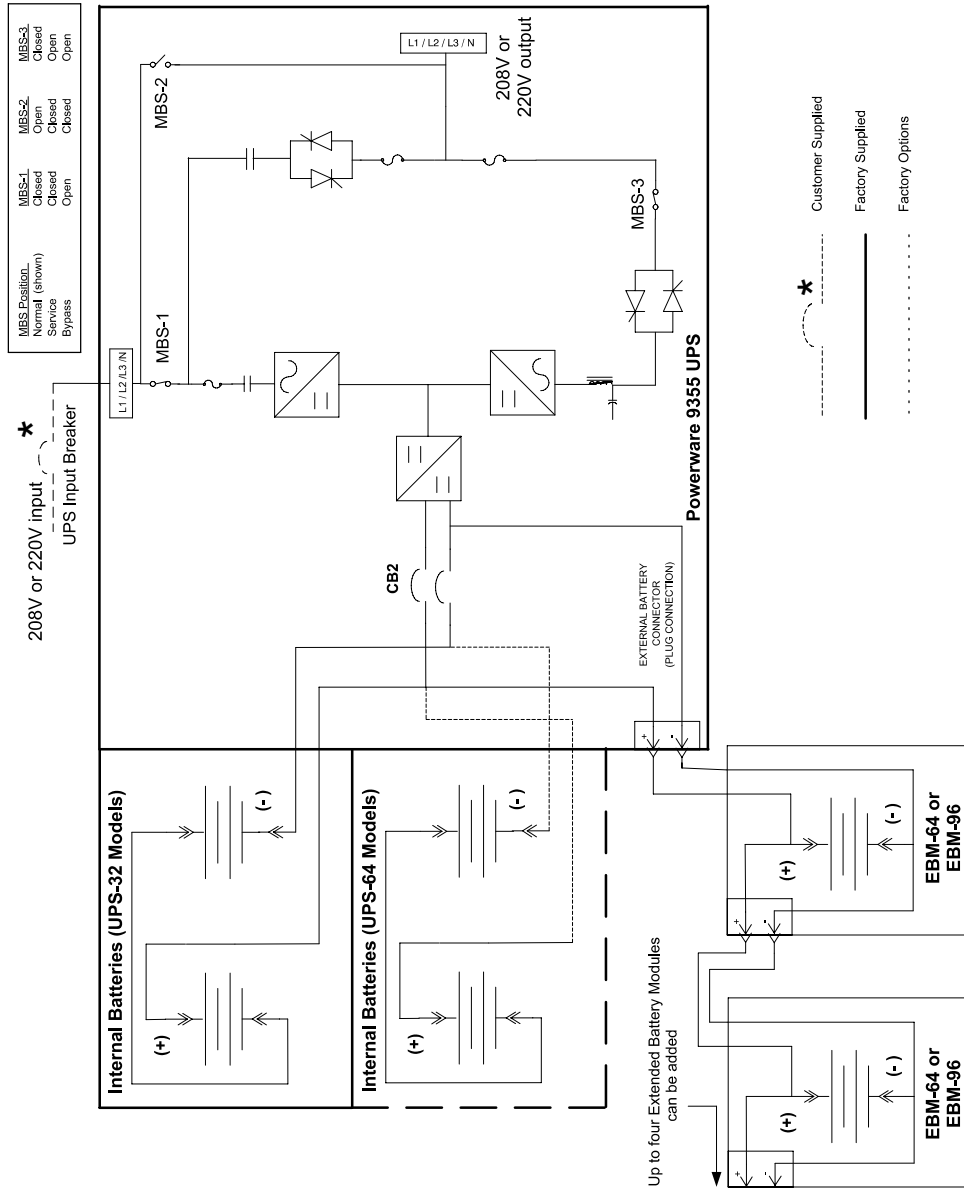


Figure 16. UPS with Extended Battery Modules Wiring Diagram

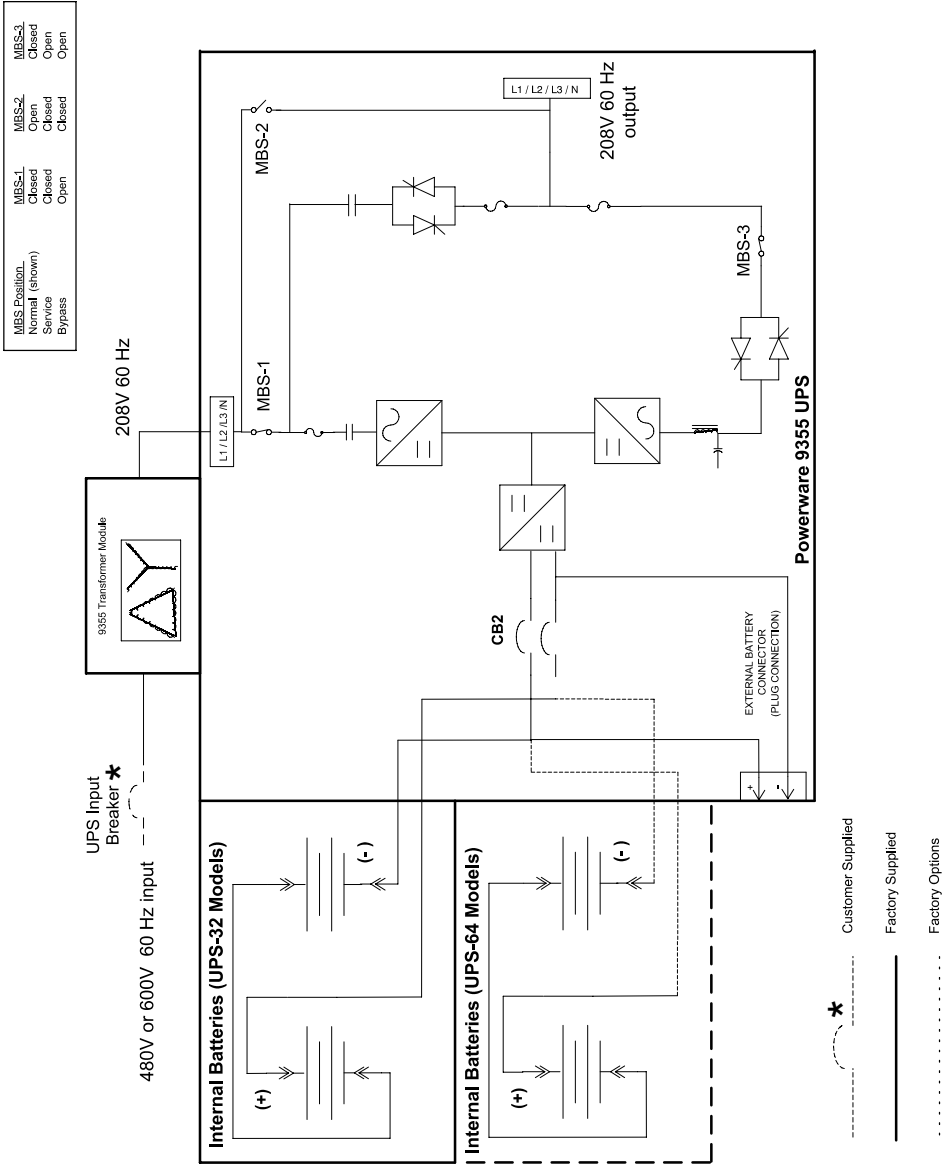


Figure 17. UPS with Input Isolation Transformer Wiring Diagram

Chapter 5 Wall-Mounted Bypass Switch Installation

This chapter describes installing the wall-mounted bypass switch with the UPS. The wall-mounted bypass switch is a Make-Before-Break maintenance bypass switch.



NOTE *The input isolation transformer cannot be used with the wall-mounted bypass switch.*

The Powerware 9355 has the following power connections:

- 3-phase (L1, L2, and L3), neutral, and ground connection for rectifier/bypass input
- 3-phase (L1, L2, and L3), neutral, and ground connection for load output

The nominal input/output voltages are:

- 120/208 or 127/220 Vac with 120° phase displacement

Output overcurrent protection and disconnect switch must be provided by others.

WARNING



Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

Use the following procedure to hardwire the bypass cabinet:

1. Verify that the electrical connections to the installation site have been properly installed.
2. A wall-mounted, user-supplied, readily-accessible disconnection device must be incorporated in the input wiring.

Compare the circuit breaker ratings to the ones in Table 2 on page 33.

3. Switch off utility power to the distribution point where the bypass cabinet and UPS will be connected. Be absolutely sure there is no power.

4. Determine your equipment's grounding requirements according to your local electrical code.
5. Remove the bypass cabinet front cover (see Figure 18).

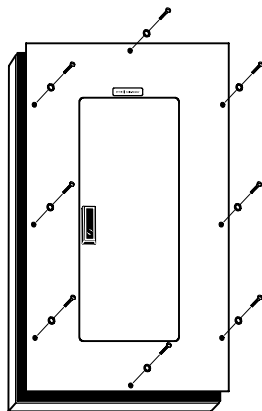


Figure 18. Bypass Cabinet Front Cover

6. Remove the internal cover to gain access to the breakers (see Figure 19).

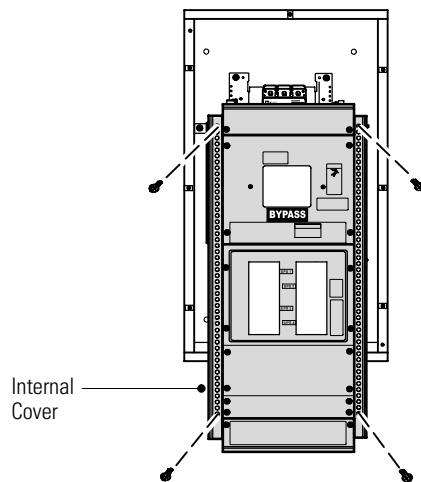


Figure 19. Internal Cover

7. Punch holes for the conduit (AC input, UPS output, load connection, and maintenance bypass contact wires) using a Greenlee punch or similar device.
8. Verify that the bypass breaker is in the OFF position (see Figure 20).
9. Mount the bypass cabinet to the wall and install the conduit.

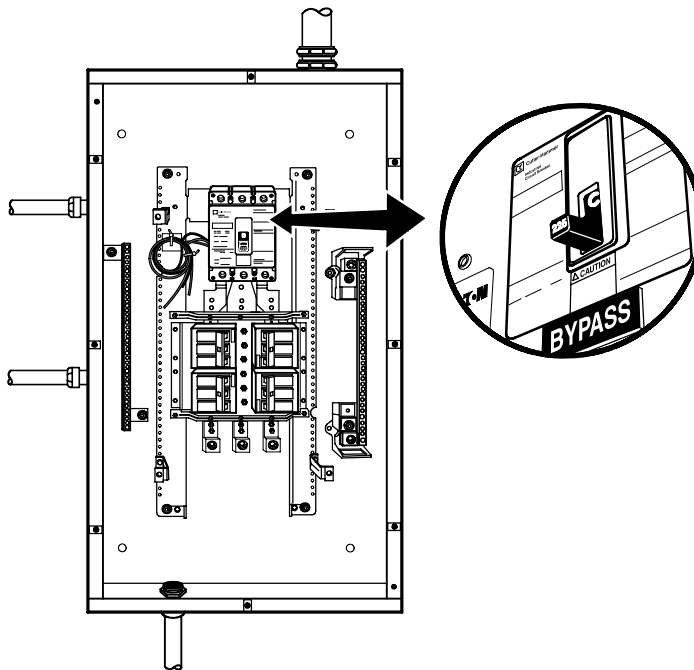


Figure 20. Bypass Breaker

10. Verify that the UPS battery circuit breaker is in the OFF position (see Figure 21).
11. Remove the UPS wiring access cover and one of the conduit landing plates and retain.

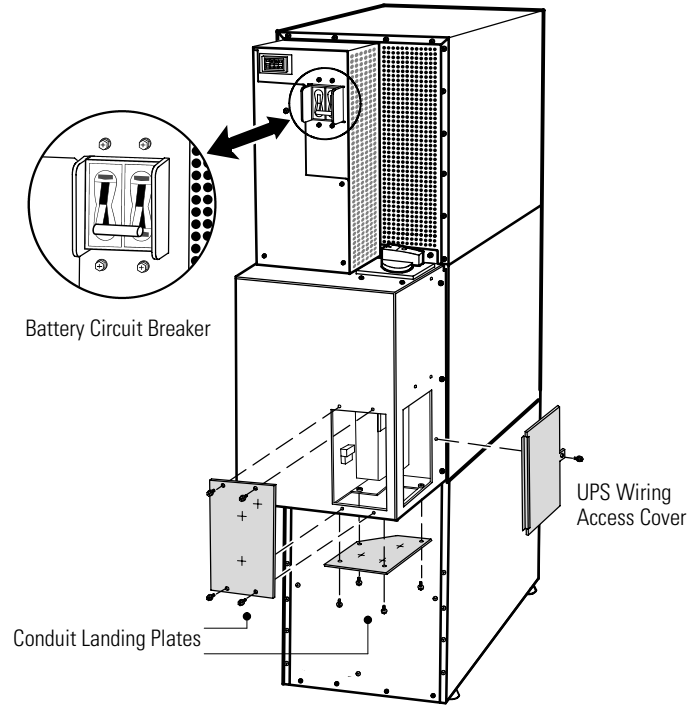


Figure 21. UPS Rear View (3-High Shown)

12. Hardwire the UPS input terminations.

See Table 2 for specifications and Figure 22 for a detailed view of the UPS terminal block.



NOTE Input neutral must be wired for proper operation. Failure to connect an input neutral will void the warranty.

NOTE The Powerware 9355 UPS is a single-feed UPS only.

Table 2. UPS Terminal Block Wiring

10 kVA Input Voltage	Wire Function	Input Circuit Breaker Size	L1, L2, L3, N Wire Size ¹	Ground Wire Size ¹	Tightening Torque	Conduit Size ^{2,3} (Number of Conduits)
208	Input	45A	6 AWG	10 AWG	120 lb in (13.5 Nm)	1.00" conduit (1)
220		45A	8 AWG	10 AWG		
208	Output		8 AWG	10 AWG	120 lb in (13.5 Nm)	1.00" conduit (1)
220			8 AWG	10 AWG		
15 kVA Input Voltage	Wire Function	Input Circuit Breaker Size	L1, L2, L3, N Wire Size ¹	Ground Wire Size ¹	Tightening Torque	Conduit Size ^{2,3} (Number of Conduits)
208	Input	60A	4 AWG	10 AWG	120 lb in (13.5 Nm)	1.25" conduit (1)
220		60A	4 AWG	10 AWG		1.25" conduit (1)
208	Output		6 AWG	10 AWG	120 lb in (13.5 Nm)	1.00" conduit (1)
220			6 AWG	10 AWG		

¹ Use only 90°C-rated copper wire. Minimum wire size is based on 120/208 full load ratings applied to NEC Code Table 310-16. Code may require a larger AWG size than shown in this table because of temperature, number of conductors in the conduit, or long service runs. Follow local requirements.

² Per NEC article 300-20(a), all three-phase conductors must be run in the same conduit. Neutral and ground must be run in the same conduit as the phase conductors.

³ Conduit is sized to accommodate one neutral conductor the same size as the phase conductor and one #8 AWG ground conductor. If two neutral conductors or an oversized neutral conductor are to be installed, check the size of the conduit needed to accommodate the extra wire or size and use that conduit size in place of the conduit size listed. Conduit sizes were chosen from NEC Table C1, type letters RHH, RHW, RHW-2, TW, THW, THHW, THW-2.

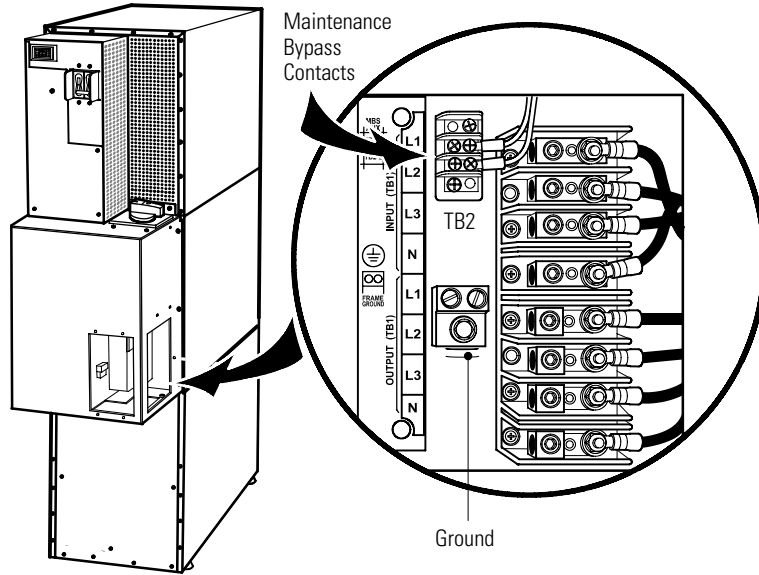


Figure 22. UPS Terminal Block (3-High Shown)

13. Hardwire the output terminations from the UPS to the bypass cabinet (see Figure 23).

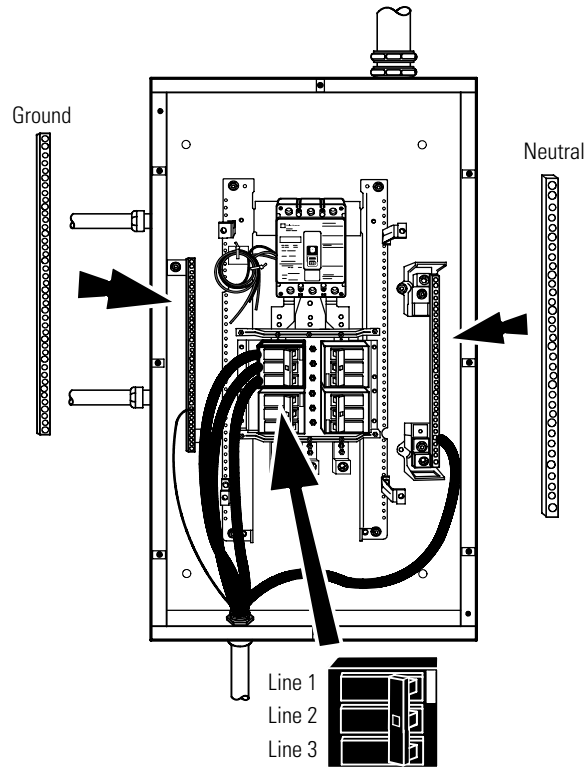


Figure 23. UPS Output to Bypass Cabinet Wiring

14. Hardwire the load to the bypass cabinet (see Figure 24).
15. Route the maintenance bypass wires through the conduit to the UPS terminal block (see Figure 22 on page 36).

Connect the black wire to TB2-2 and the blue wire to TB2-3. Cap the red wire.



NOTE The maintenance bypass contacts are normally-closed. To ensure proper bypass operation, DO NOT use the red wire (it is normally-open).

16. Replace the UPS wiring access cover and conduit landing plate.

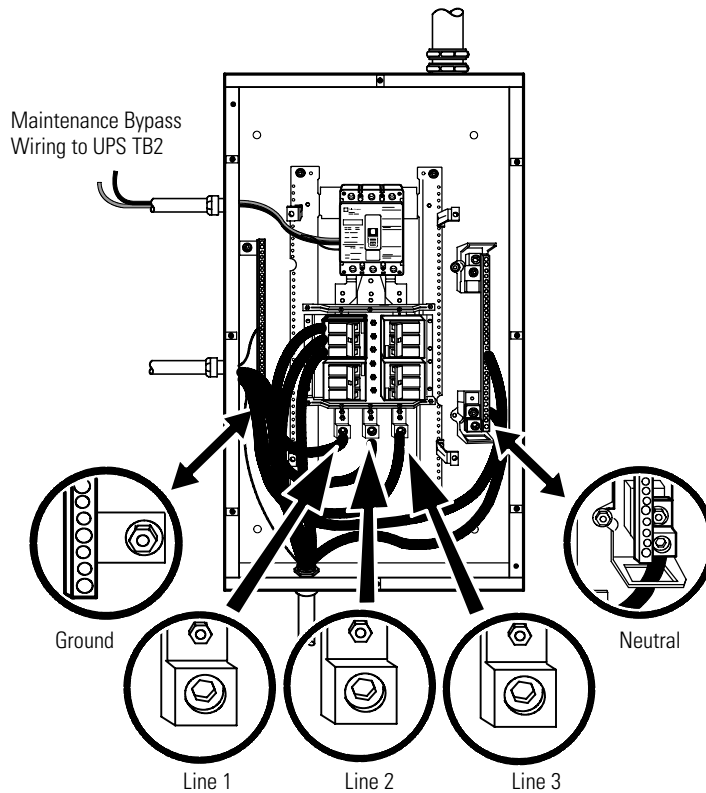


Figure 24. Load Connections

17. Wire the AC input to the bypass breaker (see Figure 25).

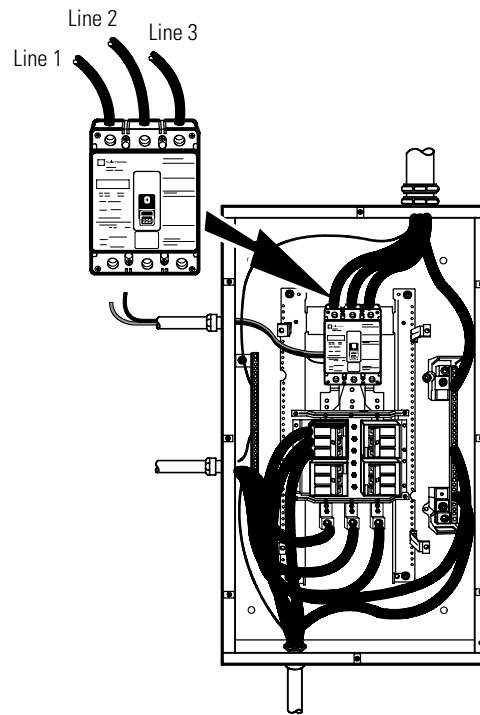


Figure 25. Bypass AC Input Wiring

18. Verify the bypass input.
19. Reinstall the internal cover.
20. Reinstall the bypass cabinet front cover.
21. Continue to "Stabilizing the Cabinet" on page 39 to complete the UPS installation.

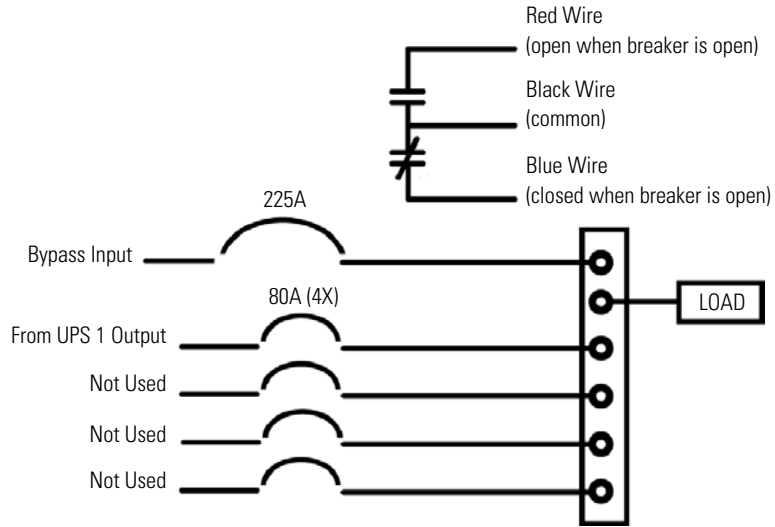


Figure 26. Bypass Wiring Diagram

Chapter 6 Stabilizing the Cabinet



NOTE For seismic installations, you **MUST** order and install a Powerware 9355 UPS seismic kit; do not use the following instructions.

NOTE For non-seismic installations, you **MUST** install the stabilizing bracket on all 3-high cabinets. The stabilizing bracket is optional for 2-high cabinets.

1. Lower the leveling feet to prevent the cabinet from rolling.

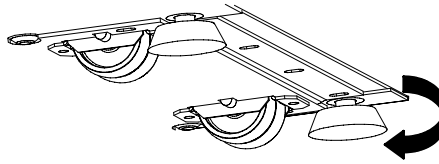


Figure 27. Lowering the Leveling Feet

2. Attach the stabilizing bracket to the bottom of the cabinet rear panel using the retained hardware from the shipping pallet according to the cabinet configuration:
 - For one cabinet, see Figure 28.
 - For two cabinets, see Figure 29.
 - For three cabinets, see Figure 30.



NOTE No more than three cabinets can be attached together. For four cabinets, use two of the two-cabinet installations. For five cabinets, use one three-cabinet and one two-cabinet installation.

3. Use the holes and slots in the bottom of the bracket to attach the cabinet to the flooring if desired.

4. Continue to one of the following sections:

- "Extended Battery Module Installation" on page 43 to install optional EBMs.
- "Communication" on page 47 to install UPS communication options, such as X-Slot cards or Remote Emergency Power-off.
- "Operation" on page 65 to start up the UPS.

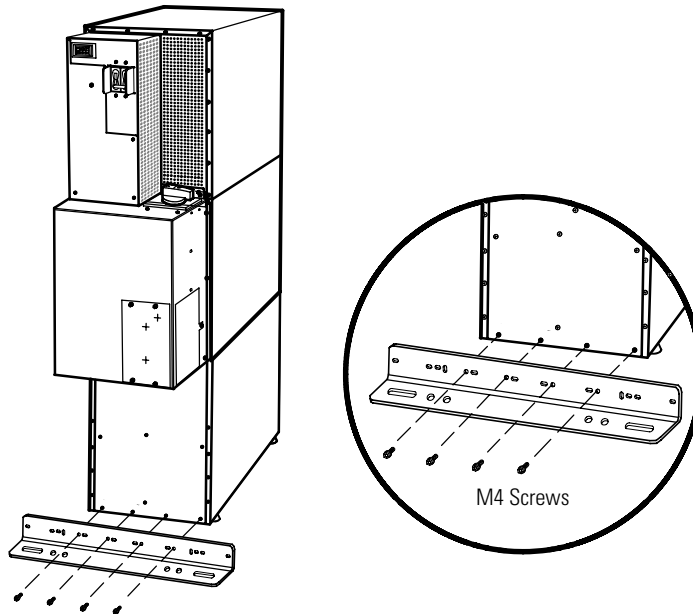


Figure 28. Stabilizing Bracket with One Cabinet

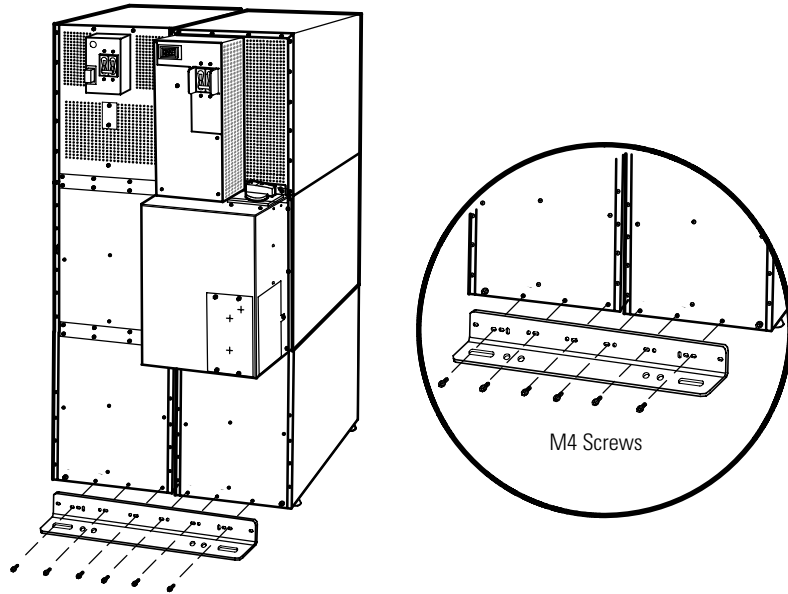


Figure 29. Stabilizing Bracket with Two Cabinets

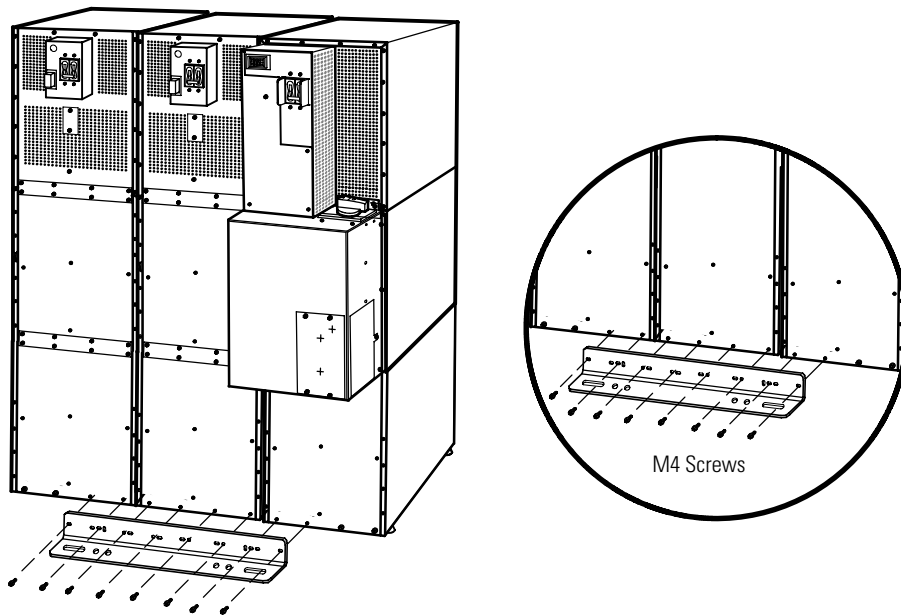


Figure 30. Stabilizing Bracket with Three Cabinets

Chapter 7 Extended Battery Module Installation



NOTE A maximum of 22 battery strings can be installed in one configuration, including UPS batteries (4 EBM-64 models or 3 EBM-96 models). UPS-32 models contain 2 strings; UPS-64 models contain 4 strings; EBM-64 models contain 4 strings; and EBM-96 models contain 6 strings.

NOTE For non-seismic installations, you **MUST** install the stabilizing bracket on all 3-high cabinets. The stabilizing bracket is optional for 2-high cabinets.

If you are installing an optional EBM(s), use the following steps:

1. Position the EBM adjacent to the next cabinet.
2. Verify that all battery circuit breakers are in the OFF position (see Figure 31).
3. Remove the two ground straps from the EBM rear panel(s).
4. Install one ground strap between the UPS and the EBM rear panels as shown in Figure 31.
5. If additional EBMs are installed, attach another ground strap between the first and second EBM as shown in Figure 31. Repeat for each additional EBM.
6. Plug the EBM cable into the UPS battery connector.
7. If additional EBMs are installed, plug the EBM cable of the second cabinet into the battery connector on the first EBM. Repeat for each additional EBM.

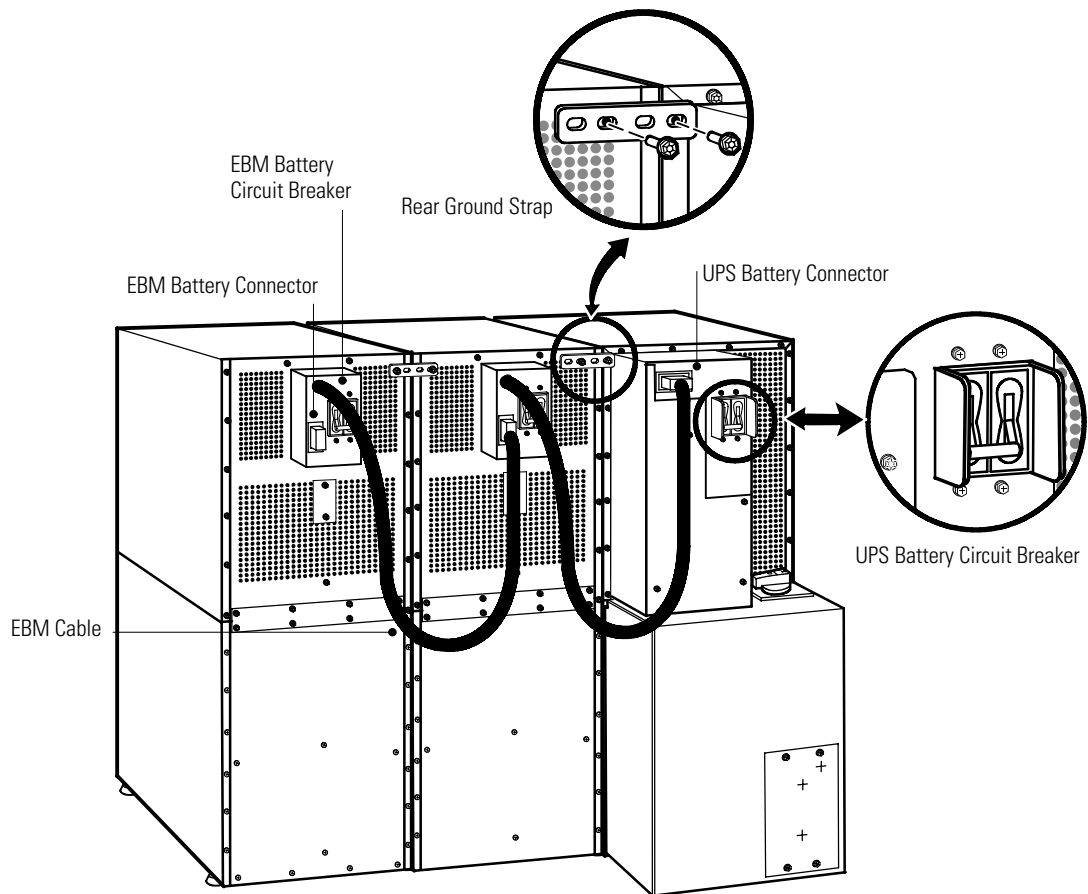


Figure 31. Typical EBM Installation (2-High Cabinets Shown)

8. Remove the top front covers of all cabinets.
9. Install the remaining ground straps between each cabinet (see Figure 32).

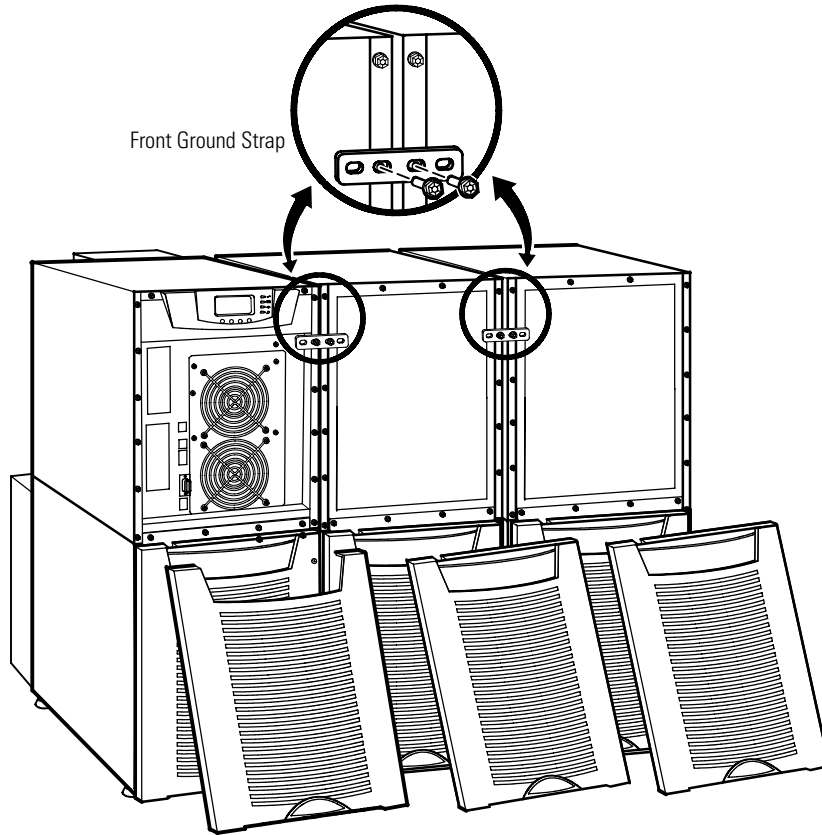


Figure 32. Front Ground Strap Installation (2-High Cabinets Shown)

10. Continue to one of the following sections:
 - “Communication” on page 47 to install UPS communication options, such as X-Slot cards or Remote Emergency Power-off.
 - “Operation” on page 65 to start up the UPS.



NOTE After UPS startup, ensure maximum battery runtime by configuring the UPS for the correct number of EBMs (see page 73).

Chapter 8 Communication

This section describes the:

- DB-9 communication port
- X-Slot cards
- Remote Monitor Panel and Industrial Relay Card (IRC)
- Powerware LanSafe Power Management Software
- Remote Emergency Power-off
- Relay output contacts
- Programmable signal inputs

Figure 33 shows the location of the communication options and control terminals on the UPS.

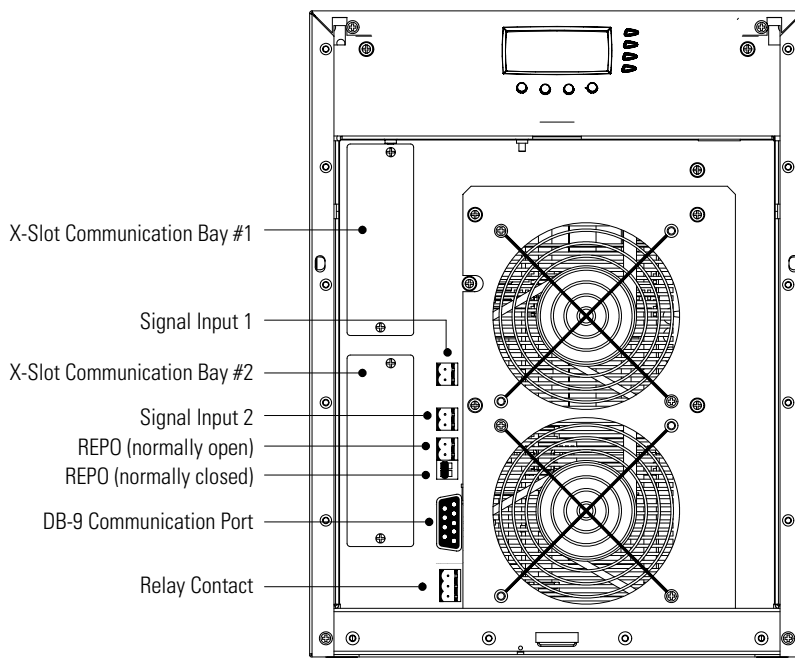


Figure 33. Communication Options and Control Terminals

Installing Communication Options and Control Terminals

To access and install the communication options and control terminals:

1. Remove the front covers of all cabinets, starting with the top cabinet. Press and release the handle latch at the bottom of each cover and then lift the cover up and off the cabinet (see Figure 34).

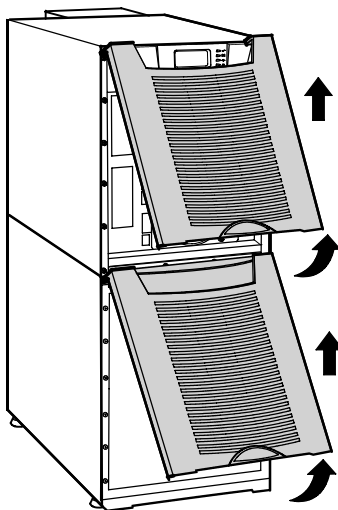


Figure 34. Removing the Front Covers

2. Install the appropriate X-Slot card and/or necessary cable(s) into the top cabinet (see Figure 33 and Figure 35).

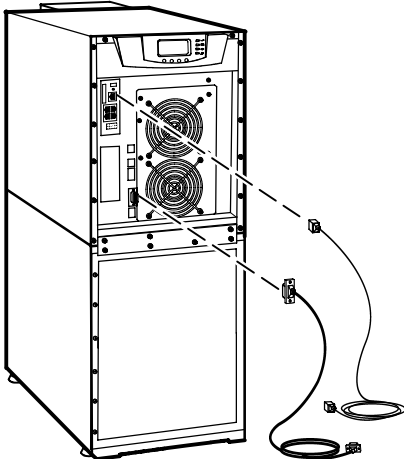


Figure 35. Installing Communication Cables

- 3. On the bottom cover (and also the middle cover if 3-high), remove a knockout tab in the top edge of the cover for each cable:

With wire cutters, cut either side of the tab and twist down to remove the tab (see Figure 36).

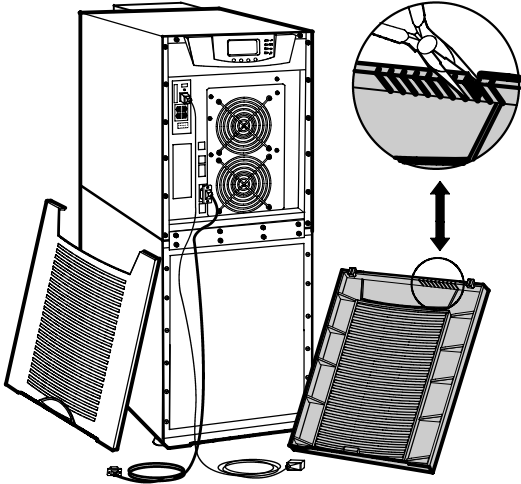


Figure 36. Removing Knockout Tabs

4. Route the cable(s) to the approximate location of the cover access holes.
5. Connect the cables to the appropriate location.

See “Communication Options” on page 51 or “Control Terminals” on page 60 for detailed information.

6. Reinstall the front covers, starting with the bottom cabinet (see Figure 37).

Hang the top edge of the cover on the cabinet first, then lower the bottom edge and snap into place. Be sure the cables fit in the access holes in the covers.

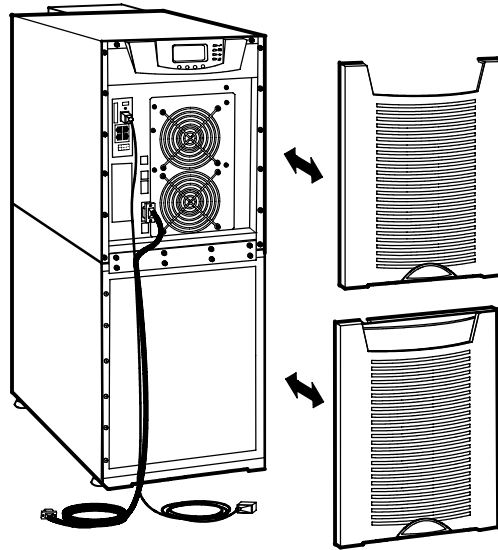


Figure 37. Reinstalling the Front Covers

7. Continue to “Operation” on page 65 to start up the UPS.

Communication Options

The Powerware 9355 has serial communication capabilities through the DB-9 communication port or through an X-Slot card in one of the available bays. In addition, the Powerware LanSafe Power Management Software can be installed and used to communicate with the UPS via one of the serial communication connections.

The UPS supports two serial communication devices according to the following table:

Independent	Multiplexed	
X-Slot 1	X-Slot 2	DB-9 Communication Port
Any X-Slot card	Any X-Slot card except the Modem Card	Not in use
Any X-Slot card	Powerware Relay Interface Card Powerware Hot Sync CAN Bridge Card	Available
Any X-Slot card	Not in use	Available



NOTE You can configure relays, signal inputs, and the serial port baud rate through the front panel menus (see Table 8 on page 68).

DB-9 Communication Port

To establish communication between the UPS and a computer, connect your computer to the UPS communication port using the supplied communication cable.

When the communication cable is installed, power management software can exchange data with the UPS. The software polls the UPS for detailed information on the status of the power environment. If a power emergency occurs, the software initiates the saving of all data and an orderly shutdown of the equipment.

The cable pins are identified in Figure 38 and the pin functions are described in Table 3. See Figure 33 on page 47 for serial port location.

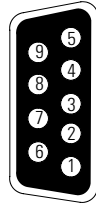


Figure 38. Communication Port

Table 3. Communication Port Pin Assignment

Pin Number	Signal Name	Function	Direction from the UPS
2	TxD	Transmit to external device	Out
3	RxD	Receive from external device	In
5	GND	Signal common (tied to chassis)	—

X-Slot Cards

X-Slot cards allow the UPS to communicate in a variety of networking environments and with different types of devices. The Powerware 9355 has two available communication bays for any X-Slot card, including:

- ConnectUPS™-X Web/SNMP Card - has SNMP and HTTP capabilities as well as monitoring through a Web browser interface; connects to a twisted-pair Ethernet (10/100BaseT) network. It has a built-in switching hub that allows three additional network devices to be connected to the network without the requirement of additional network drops. In addition, a Powerware Environmental Monitoring Probe can be attached to obtain humidity, temperature, smoke alarm, and security information.
- Relay Interface Card - has isolated dry contact (Form-C) relay outputs for UPS status: Utility failure, Low battery, UPS alarm/OK, or On bypass.
- Modbus® Card - allows you to continuously and reliably monitor the UPSs in your Building Management System (BMS).

- Industrial Relay Card - is used to indicate the operating status of the UPS using the customer’s monitoring equipment and to connect an optional RMP. The IRC uses four isolated normally-open or normally-closed dry relay contacts to indicate the UPS status. Normal, Bypass, Battery, and Alarm mode can be monitored (see page 58 for more information).
- Multi-Server Card - has six serial communication ports that can communicate simultaneously with other computers using Powerware LanSafe Power Management Software (provided on the Software Suite CD).
- Modem Card - provides out-of-band remote notification and monitoring using modem communication directly to cell phones and pagers.
- Single-Port Card - connects to the Powerware Expansion Chassis to enable multiple communication options or to a PC for power management control.
- ConnectUPS-MX SNMP Card - has Ethernet, modem, and SNMP capabilities.
- USB Card - connects to a USB port on your computer.



NOTE The Powerware 9355 does not detect plug-and-play hardware. Before installing the USB Card, set the UPS baud rate to 1200 through the front panel (see Table 8 on page 68).

See Figure 33 on page 47 for the location of the two X-Slot communication bays.

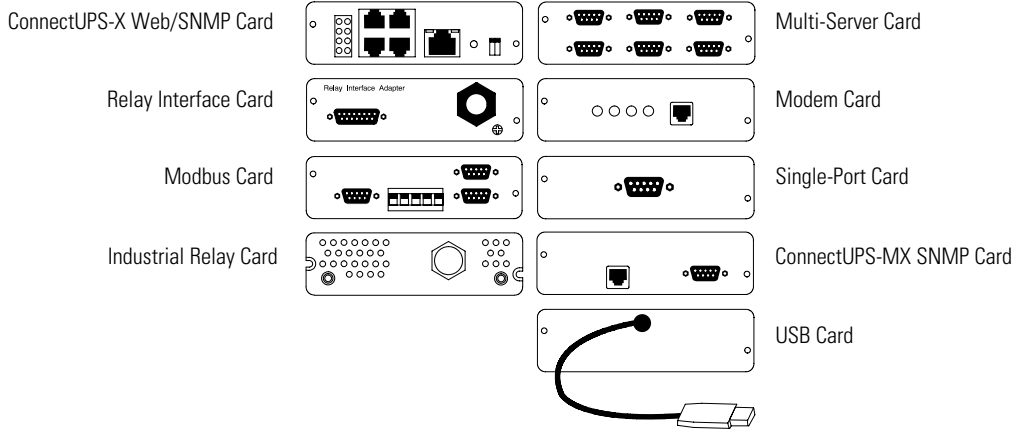


Figure 39. Optional X-Slot Cards

Remote Monitor Panel

The optional RMP can be installed to monitor the operation of the UPS from virtually any location within your facility, up to 152.4m (500 ft) from the UPS. You can surface-mount an RMP on a desktop or on a wall, wherever you have a serial interface line. Figure 40 shows an RMP. Figure 41 shows the enclosure dimensions and cable exit openings.

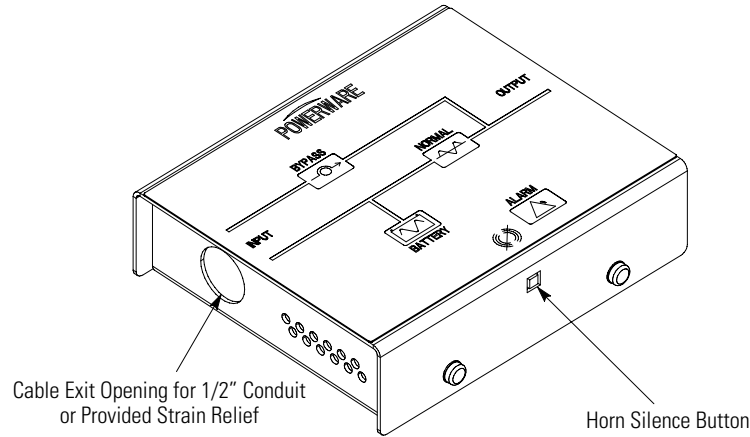


Figure 40. Remote Monitor Panel

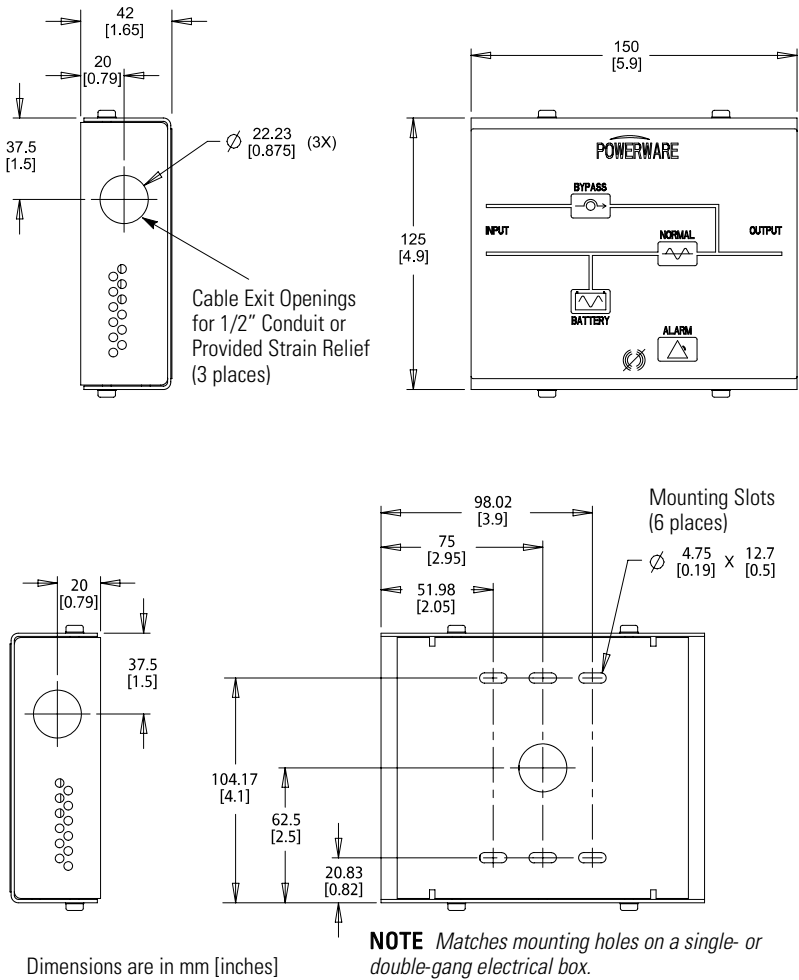


Figure 41. RMP Dimensions

To install an RMP:



NOTE *If mounting to a hollow wall, secure the enclosure bottom to a wood or metal stud within the wall. Do not use hollow wall anchors. The RMP can also be mounted to a single- or double-gang electrical box.*

1. If wall mounting, securely mount the RMP. Continue to Step 2.
If desk mounting, install the provided bumpers to the bottom of the RMP enclosure. Proceed to Step 3.
2. Install 1/2" conduit from the RMP to the IRC through the cable exit openings (see Figure 41). Proceed to Step 4.
3. Install wiring from the RMP to the IRC using the cable listed in Table 4 and the provided strain relief bushings in the cable exit openings in the IRC (see Figure 43) and the RMP.
4. Connect the wiring between the RMP and the IRC plug-in terminal blocks using terminations shown in Table 4. See Figure 42 and Figure 43 for plug-in terminal block locations.

Table 4. RMP Wire Terminations

From RMP Terminal	To IRC Terminal	Remarks
J1-1	J1-1	
J1-3	J1-3	
J1-4	J1-4	Use Beldon 8690 060 or equivalent cable
J1-5	J1-5	
J1-6	J1-6	

5. Install the IRC into an open X-Slot communication bay (see page 48).

6. To check the operation of the RMP, ensure that the UPS is supplying the load via the inverter or bypass. If the indicators on the RMP show the appropriate status, then it is operating correctly.

If the RMP is not operating correctly, check the wiring, the fuse on the IRC, and the plug-in terminal blocks for proper seating. If all connections are secure but the RMP still does not operate correctly, replace the fuse. If this does not correct the problem, contact your service representative for verification that the RMP is working correctly.

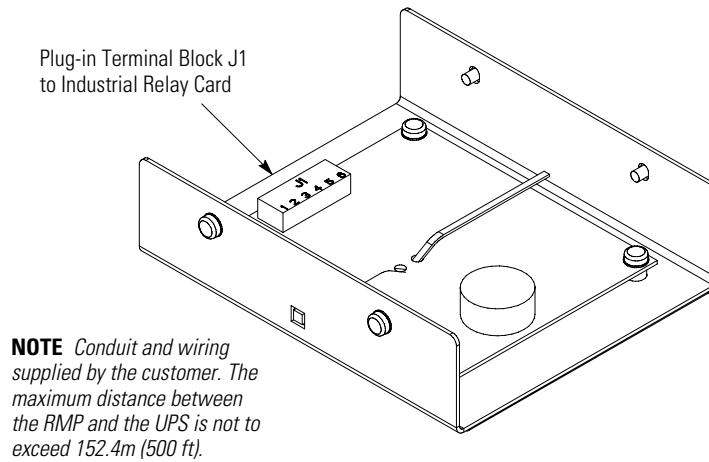


Figure 42. RMP Top Internal View

Industrial Relay Card

The IRC uses normally-open or normally-closed dry relay contacts to indicate the UPS status as listed in Table 5. Figure 43 shows an IRC.

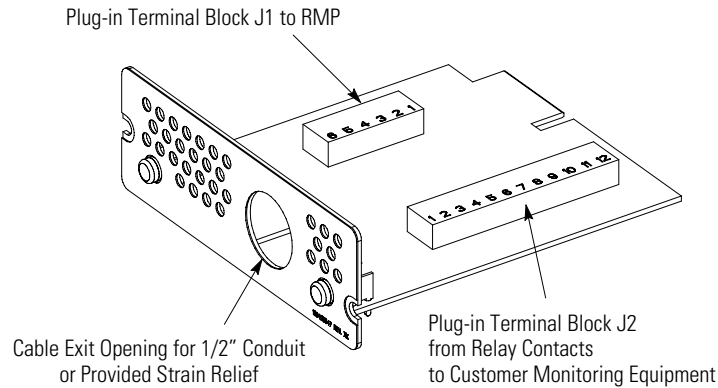


Figure 43. Industrial Relay Card

1. Verify that the UPS is turned off and all power sources are removed.
2. Install wiring from the IRC to the monitoring equipment using 1/2" conduit through the cable exit opening in the IRC (see Figure 43).
3. Connect wiring between the IRC and the monitoring equipment using terminations shown in Table 5. See Figure 43 for plug-in terminal block locations.
4. Install the IRC into an open X-Slot communication bay (see page 48).
5. To check the operation of the IRC, ensure that the UPS is supplying the load via the inverter or bypass. If the indicators on the customer's monitoring equipment show the appropriate status, then it is operating correctly.

If the IRC is not operating correctly, check the wiring, the fuse on the IRC, and the plug-in terminal blocks for proper seating. If all connections are secure but the IRC still does not operate correctly, replace the fuse. If this does not correct the problem, contact your service representative for verification that the IRC is working correctly.

Table 5. IRC Wire Terminations

IRC Terminal	Function	Remarks
J2-1	NC	
J2-2	COM	Normal mode
J2-3	NO	
J2-4	NC	
J2-5	COM	Bypass mode
J2-6	NO	
J2-7	NC	
J2-8	COM	Battery mode
J2-9	NO	
J2-10	NC	
J2-11	COM	Alarm mode
J2-12	NO	

NOTE Maximum contact rating: 250 Vac, 30 Vdc @ 5A; Wire range: 16–24 AWG

Powerware LanSafe Power Management Software

Each Powerware 9355 UPS ships with Powerware LanSafe Power Management Software and an interface cable. To begin installing Powerware LanSafe software, see the instructions accompanying the Software Suite CD.



NOTE Use only the supplied communication cable to connect the UPS to your computer.

Powerware LanSafe software provides up-to-date graphics of UPS power and system data and power flow. It also gives you a complete record of critical power events, and it notifies you of important UPS or power information. If there is a power outage and the Powerware 9355 UPS battery power becomes low, Powerware LanSafe software can automatically shut down your computer system to protect your data before the UPS shutdown occurs.

Control Terminals

The cables should be connected to the control terminals with a mating connector. Input and output terminals have a functional isolation from terminal to terminal. They are connected to the UPS chassis through individual 1 MΩ resistors.

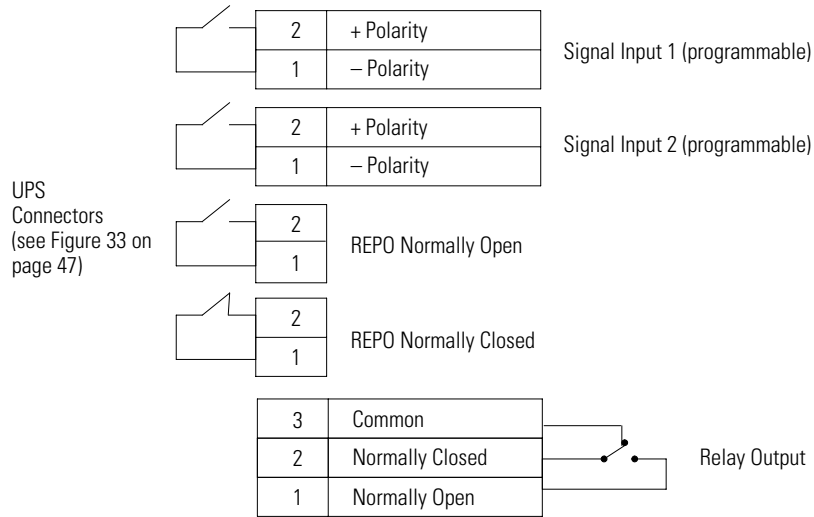


Figure 44. External Control Terminal Connections



NOTE If using a semiconductor switch type, pay attention to the proper polarity. A relay or other mechanical control is preferred.

Remote Emergency Power-off

REPO is used to shut down the UPS from a distance. This feature can be used for shutting down the load and the UPS by thermal relay, for instance in the event of room overtemperature. When REPO is activated, the UPS shuts down all converters, de-energizes all system relays, and fully powers down within 10-15 seconds.

There are two REPO positions that may be used, normally-open or normally-closed.

The pins on the normally-closed REPO connector are connected together. When this connection is open, the logic circuitry completely shuts down the UPS, thus preventing the power from supplying the load.

If the use of normally-closed REPO operation is desired, replace the connector with a normally-closed external switch (see Figure 33 on page 47).

If the use of normally-open REPO operation is desired, connect a normally-open external switch (see Figure 33 on page 47).



NOTE To restart the UPS, reconnect the REPO connector pins and turn on the UPS manually. The pins must be shorted to keep the UPS running. Maximum resistance is 10 ohm.

NOTE Leave the REPO connector installed in the REPO port on the UPS rear panel even if the REPO function is not needed.

CAUTION



The REPO must not be connected to any utility connected circuits. Reinforced insulation to the utility is required. The REPO switch must have a minimum rating of 24 Vdc and 20 mA.

To ensure the UPS stops supplying power to the load during any mode of operation, the input power must be disconnected from the UPS when the emergency power-off function is activated.

REPO Connections			
	Wire Function	Terminal Wire Size Rating	Suggested Wire Size
REPO	L1	12–22 AWG (4–0.32 mm ²)	18 AWG (0.82 mm ²)
	L2		

Relay Output Contacts

The UPS incorporates a programmable relay output with potential free contacts for remote alarm indications (see Figure 33 on page 47). An additional four relay outputs can be obtained with the X-Slot compatible Relay Interface Card.



WARNING

The relay contacts must not be connected to any utility connected circuits. Reinforced insulation to the utility is required. The relay contacts must have a maximum rating of 30 Vdc/1A and 60 Vdc/2A nominal values.

Programmable Signal Inputs

The UPS incorporates two programmable signal inputs (see Figure 33 on page 47). Use of non-polar (relay) control input is recommended. The pins must be shorted with maximum resistance of 10 ohm in order to activate the specific input.



NOTE See Figure 44 on page 60 for the polarity and verify these connections if polarity control is required.

The default and programmable settings for the signal inputs are shown in Table 6.

Table 6. Programmable Signal Inputs

Signal	Description
Disable Bypass Operation	If active, the automatic transfer to the static bypass is prevented.
Charger Off	If active, the battery charge function is disabled. In a utility power outage, the discharge of batteries is supported.
Remote ON/OFF	If active, the UPS output turns off regardless of the mode of operation. Auxiliary power, fan, communication, and rectifier/battery charger remain functional. Restart is initiated immediately when this signal is inactive.
Request Bypass	If active, the UPS transfers to bypass if the bypass voltage, frequency, and synchronization are all okay.
Request Normal	If active, the UPS transfers to inverter operation if not prohibited by REPO or an alarm condition.
Force Bypass	If active, the UPS is forced to static bypass operation regardless of the bypass status.
External Battery Breaker Status	If active, the UPS knows that the batteries are disconnected.
Building Alarm 1–6	These alarms can be activated separately or at the same time with other building alarms.
Not in Use	Default
Shutdown	If active, the UPS shuts down immediately.
Delayed Shutdown	If active, the UPS shuts down after a user-configured delay time. Default shutdown delay is 120 seconds. The UPS automatically restarts when the signal changes to inactive.
Normal/Bypass	If active, the UPS transfers to bypass if okay. If inactive, the UPS transfers to the inverter when possible.
On Generator	If active, the UPS knows that input is fed from the generator. Bypass is disabled; the automatic battery test is disabled.
External Transformer Overtemperature	This option is not used.

Chapter 9 Operation

This chapter contains information on how to use the Powerware 9355, including front panel operation, UPS startup and shutdown, and configuring the UPS for Extended Battery Modules.

Control Panel Functions

The UPS has a four-button graphical LCD with backlight. It provides useful information about the UPS itself, load status, events, measurements, and settings (see Figure 45).

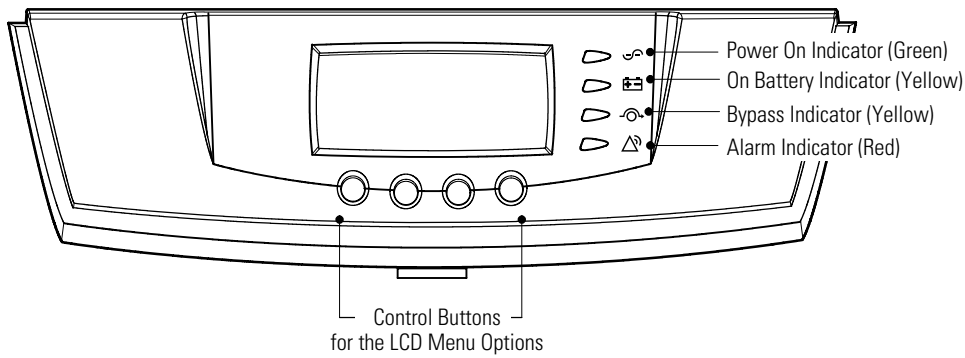






Figure 45. Powerware 9355 Control Panel

The following table shows the indicator status and description.

Indicator	Status	Description
 Green	On	The UPS is operating normally.
	Flashing	<ul style="list-style-type: none"> The UPS is starting up or is shut down and waiting for power to return. A new information message is active. Bypass is not available.
	Off	The UPS is turned off and will not turn on automatically.
 Yellow	On	The UPS is in Battery mode.
 Yellow	On	The UPS is in Bypass mode.
 Red	On	The UPS has an active alarm.
	Flashing	There is a new UPS alarm condition. See "Troubleshooting" on page 87 for additional information.

Changing the Language

Press and hold the first button on the left for approximately five seconds to select the language menu. This action is possible from any LCD menu screen.

Display Functions

As the default or after 15 minutes of inactivity, the LCD displays the selectable startup screen. The default is the Eaton Powerware logo and can be changed to the Mimic screen in the User Settings menu.

The backlit LCD automatically dims after a long period of inactivity. Press any button to restore the screen.

Use the two middle buttons (↑ and ↓) to scroll through the menu structure. Press the → button to enter a submenu. Press the ← button to select an option. Press the **ESC** button to cancel or return to the previous menu.

The following table shows the basic menu structure.

Table 7. Menu Map for Display Functions

Main Menu	Submenu	Display Information or Menu Function
UPS Status		UPS off / System normal / UPS supporting load / UPS on battery / UPS on bypass / Active alarm list / Battery status
Event Log		Displays up to 100 events and alarms
Measurements	Output	L-N and L-L / Current / Frequency / Power
	Battery	Voltage / Current / Runtime
	Input	L-N and L-L / Current / Frequency
	Bypass	L-N and L-L / Frequency
Control	Go to Bypass Mode	Forces the UPS to go to Bypass. When this command is active, the option changes to Go to Normal Mode.
	Start Battery Test	Initiates a battery test
	Display Test	Four different selectable tests for the front panel functions: the LEDs cycle through, the alarm beep sounds, the backlight turns off and on, and the pixels scroll through to test the LCD.
Settings	User Settings	See Table 8 for detail.
	Service Settings	This screen is password-protected.
Identification		UPS Type / Part Number / Serial Number / Firmware / Display / CAN Bridge
Turn UPS ON/OFF	ON and OFF Options	

User Settings

The following table displays the options that can be changed by the user.



NOTE Changes to the output voltage or frequency options should be made before turning on the UPS; otherwise, the changes do not take effect.

Table 8. User Settings

Description	Available Settings	Default Setting
Set Date and Time	Set Month Date: mm/dd/yyyy Time: 24:00	01/01/2003 00:00
Display Contrast	Adjust contrast with up/down arrow buttons	Moderate
Change Language	Select Language: <English> or <Spanish>	English
Set Nominal Input Voltage	Output: [120V/208V] [127V/220V]	120V/208V
Relay Config	Relay: [Alarm 1] [X-Slot 1-1/2/3/4] or [X-Slot 2-1/2/3/4] Setup: [Battery Low] [On Battery] [On Bypass] [UPS ok] [custom] [empty]	Alarm 1: empty X-Slots (1 or 2) #1: UPS ok #2: On Bypass #3: Summary Alarm #4: On Battery
Signal Inputs	[empty] [Logic] (see "Programmable Signal Inputs" on page 62)	Empty
Serial Port Config	Port: [X-Slot-1] [X-Slot-2/Serv] Speed: [19200] [9600] [2400] [1200]	19200
Start Screen	Eaton Powerware logo Mimic Screen	Eaton Powerware logo
User Password	Enabled/Disabled If Enabled is selected, the password is USER.	Disabled
Audible Alarms	Normal Sound/Disabled	Normal Sound
Battery Charging	ABM cycling/constant	ABM cycling

Table 8. User Settings (continued)

Description	Available Settings	Default Setting
Automatic Battery Tests	Enabled/Disabled Enabled automatically runs the battery test once a month.	Enabled
Full Power Battery Test	Enabled/Disabled	Enabled
Number of Battery Strings	0 through 22 (see "Configuring the UPS for EBMs" on page 73)	2 strings for UPS-32 models 4 strings for UPS-64 models
Battery Capacity	1 through 65535 watts per cell	34 W/cell
Battery Low Alarm Level	1.750 through 1.950 volts per cell	1.880 V/cell
Bypass Voltage High Limit	+1 through +20% (1% increments)	120V +10%
Bypass Voltage Low Limit	-1 through -20% (1% increments)	120V -15%
Nominal Output Frequency	50 Hz or 60 Hz	60 Hz
Synchronization	Enabled/Disabled	Enabled
Synchronization Window	±0.5 through ±3.0 Hz (0.1 Hz increments)	±2.0 Hz
Unsynchronized Transfer to Bypass	Allowed/Not Allowed	Not Allowed
Usage of Bypass	Enabled/Disabled	Enabled
Transfer to Bypass When Overload	After a delay/Immediately	After a delay
Automatic Start Delay	-1 through 32767 seconds (-1 means disabled)	0s
Control Commands from X-Slot1	Allowed/Disabled	Allowed
Control Commands from X-Slot2/Serv	Allowed/Disabled	Allowed
X-Slot Signal Input Activation Delay	0 through 65 seconds	5s
Input signal delayed shutdown delay	1 through 65535 seconds	120s
Site Wiring Fault Notice	Enabled/Disabled	Enabled
Reset Custom Event Settings	0 through 32	Empty
Auto Output Configuration	Enabled/Disabled	Enabled for initial startup Disabled after initial startup

Initial Startup

Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms as specified on page 91 become void. This service is offered as part of the sales contract for the UPS. Contact service in advance (usually a two-week notice is required) to reserve a preferred startup date.

UPS Startup



WARNING

Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

Verify that UPS installation has been carried out correctly and the UPS ground has been connected.

Maintenance Bypass Startup

To start up the UPS in maintenance bypass:

1. Verify that the maintenance bypass switch is in the BYPASS position (see Figure 46 on page 79).
2. Switch on utility power where the UPS is connected. The load is now powered by utility power.


To switch to Normal mode from maintenance bypass:

1. If an optional isolation transformer is installed, switch the input circuit breaker to the ON position.
2. Turn the maintenance bypass switch to the SERVICE position.

The UPS starts up in Bypass mode, with the load still powered by utility power.

3. Remove the breaker tie from all battery circuit breakers.
4. Switch all battery circuit breakers to the ON position.




NOTE Wait until the  indicator illuminates before proceeding to Step 5; otherwise, power to the load may be lost.





5. Turn the maintenance bypass switch to the UPS position to return to Normal mode. The UPS is now powering the load.



Internal Bypass Startup

To start up the UPS in Bypass mode:



1. Verify that the maintenance bypass switch is in the UPS position (see Figure 46 on page 79).
2. If an optional isolation transformer is installed, switch the input circuit breaker to the ON position.
3. Switch on utility power where the UPS is connected.
4. Wait for the front panel LCD to illuminate.

The  indicator flashes.

5. Remove the breaker tie from all battery circuit breakers.
 6. Switch all battery circuit breakers to the ON position.
- The  indicator stops flashing.
7. Press any button on the front panel display to activate the menu options.
 8. Using the  button on the front panel display, scroll to the Control menu option and press the  button.
 9. Press the  button to select the Go to Bypass Mode option.

The  and  indicators illuminate, indicating the UPS is operating in Bypass mode. The load is now powered by utility power.


To switch to Normal mode from internal Bypass mode:

1. Press the  button to select the Go To Normal Mode option.
2. Press the  button until the Eaton Powerware logo appears.


Normal Mode Startup




To start up the UPS:

1. Verify that the maintenance bypass switch is in the UPS position (see Figure 46 on page 79).
2. If an optional isolation transformer is installed, switch the input circuit breaker to the ON position.
3. Switch on utility power where the UPS is connected.
4. Wait for the front panel LCD to illuminate.


The  indicator flashes.

5. Remove the breaker tie from all battery circuit breakers.
6. Switch all battery circuit breakers to the ON position.

The  indicator stops flashing.

7. Press any button on the front panel display to activate the menu options.
8. Press the  button on the front panel display and then press the  button to select the TURN UPS ON/OFF menu.
9. Select the ON option. Press and hold the  button for three seconds, until the UPS stops beeping.

The  indicator illuminates. The UPS is now powering the load.

If the  indicator is flashing, check the UPS status from the front panel to view the active alarms. Correct the alarms and restart if necessary.

Starting the UPS on Battery



NOTE Before using this feature, the UPS must have been powered by utility power at least once.

To start the UPS on battery:

1. Verify that the maintenance bypass switch is in the UPS position (see Figure 46 on page 79).
2. Switch all battery circuit breakers to the ON position.



NOTE Leave the battery circuit breaker(s) in the ON position during this operation. If you need to cancel this operation, wait until the front panel LCD illuminates before switching the battery circuit breaker(s) off.

3. Wait for the front panel LCD to illuminate.
4. Press any button on the front panel display to activate the menu options.
5. Within three minutes, press the ↑ button on the front panel display and then press the → button to select the TURN UPS ON/OFF menu.
6. Select the ON option. Press and hold the ← button for three seconds, until the UPS stops beeping.

The UPS starts within two minutes. The UPS supplies power to your equipment and goes into Battery mode.

Configuring the UPS for EBMs

To ensure maximum battery runtime, configure the UPS for the correct number of EBMs:

1. Press any button on the front panel display to activate the menu options.
2. Using the ↑ button, scroll to the Settings menu.
3. Press the → button twice to select the User Settings menu.
4. Using the ↓ button, scroll to the Number of Battery Strings option and press the → button.

5. Use the ↑ or ↓ arrow buttons to select the number of strings according to your UPS configuration:

All 2-High UPS and EBM Cabinets*	Number of Strings
UPS + 1 EBM	6
UPS + 2 EBMs	10
UPS + 3 EBMs	14
UPS + 4 EBMs	18
All 3-High UPS and EBM Cabinets*	Number of Strings
UPS + 1 EBM	10
UPS + 2 EBMs	16
UPS + 3 EBMs	22

*UPS-32 models contain 2 strings; EBM-64 models contain 4 strings.
UPS-64 models contain 4 strings; EBM-96 models contain 6 strings.

6. Press the ← button to save the setting.
7. Press the **ESC** button until the Eaton Powerware logo appears.

UPS Shutdown

To shut down the UPS:

1. Press any button on the front panel display to activate the menu options.
2. Press the ↑ button on the front panel display and then press the → button to select the TURN UPS ON/OFF menu.
3. Select the OFF option; press the ← button.
4. Confirm the selection; press the ← button.
5. Press and hold the ← button for three seconds, until the UPS stops beeping.

The input contactor opens.

6. Switch the UPS battery circuit breaker to the OFF position.

The UPS is disconnected from the batteries and is on logic power only.

7. Switch off utility power where the UPS is connected.

Chapter 10 UPS Maintenance

This section explains how to:

- Care for the UPS and batteries
- Recycle used batteries
- Use the maintenance bypass switch

UPS and Battery Care

For the best preventive maintenance, keep the area around the UPS clean and dust-free. If the atmosphere is very dusty, clean the outside of the system with a vacuum cleaner.

For full battery life, keep the UPS at an ambient temperature of 77°F (25°C).




NOTE *The batteries in the UPS are rated for a 3–5 year service life. The length of service life varies, depending on the frequency of usage and ambient temperature. Batteries used beyond expected service life will often have severely reduced runtimes. Replace batteries at least every 5 years to keep units running at peak efficiency.*

Storing the UPS and Batteries

When storing the UPS and optional cabinets, the following requirements should be met:

- Verify that the battery circuit breaker is in the OFF position.
- Avoid temperature and humidity extremes. To maximize battery life, the recommended storage temperature is 59°F (15°C) to 77°F (25°C).
- If you store the UPS for a long period, recharge the batteries every 10 months by applying utility power. The batteries charge to 80% capacity in approximately 3 hours. However, it is recommended that the batteries charge for 48 hours after long-term storage.
- Check the battery recharge date on the shipping carton label. If the date has expired and the batteries were never recharged, do not use the UPS. Contact your service representative.

When to Replace Batteries

When the  indicator flashes and the LCD panel displays Battery Failure, the batteries may need replacing. Contact your service representative to order new batteries.

Change the batteries approximately every five years.

Recycling the Used Battery or UPS

Contact your local recycling or hazardous waste center for information on proper disposal of the used battery or UPS.



WARNING

- Do not dispose of the battery or batteries in a fire. Batteries may explode. Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
- Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.



CAUTION

Do not discard the UPS or the UPS batteries in the trash. This product contains sealed, lead-acid batteries and must be disposed of properly. For more information, contact your local recycling/reuse or hazardous waste center.



CAUTION

Do not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.

Using the UPS Maintenance Bypass Switch

The UPS maintenance bypass switch is located on the back of the UPS (see Figure 46).

The maintenance bypass switch is used to bypass the UPS during maintenance or servicing. The switch provides a wrap-around bypass without shutting down the load. The SERVICE position on the switch allows a service engineer to apply power to the UPS input and verify its operation while the load is powered through bypass.

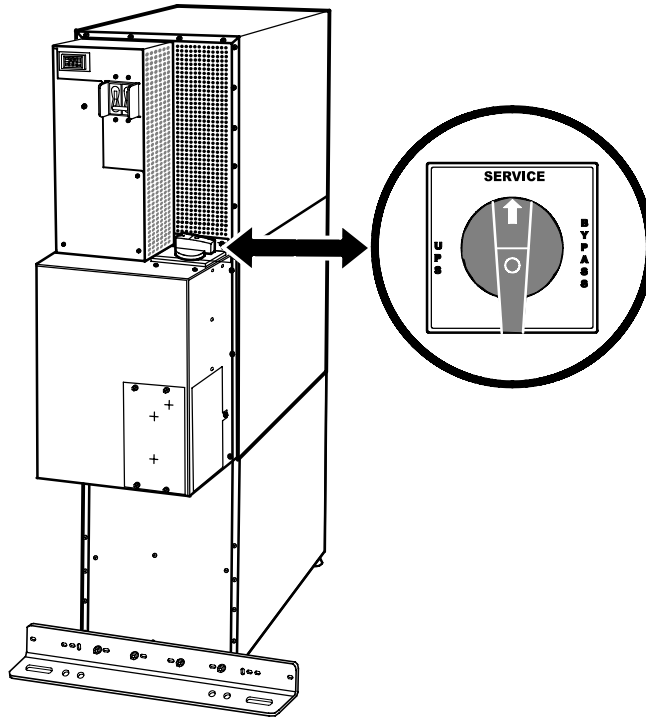


Figure 46. Maintenance Bypass Switch

To switch the UPS to maintenance bypass from Normal mode:

1. Turn the maintenance bypass switch through the SERVICE position to the BYPASS position.

The battery circuit breaker trips, and the UPS is now bypassed, with the load powered by utility power.

2. The UPS automatically shuts down.


To return to Normal mode from maintenance bypass:

1. Turn the maintenance bypass switch to the SERVICE position.

The UPS starts up in Bypass mode, with the load still powered by utility power.

2. Switch the UPS battery circuit breaker to the ON position.



NOTE Wait until the  indicator illuminates before proceeding to Step 3; otherwise, power to the load may be lost.

3. Turn the maintenance bypass switch to the UPS position to return to Normal mode. The UPS is now powering the load.

Chapter 11 Specifications

This section provides the following specifications for the Powerware 9355 models:

- Model list
- Dimensions and weights
- Environmental and safety specifications
- Technical specifications
- Model specifications
- Battery specifications
- Battery runtimes

Table 9. Model List

UPS	Description	Power Rating
PW9355-10-32	2-high: UPS with one battery section 3-high: UPS with one battery and one isolation transformer section	10 kVA, 9 kW
PW9355-10-64	3-high: UPS with two battery sections	10 kVA, 9 kW
PW9355-15-32	2-high: UPS with one battery section 3-high: UPS with one battery and one isolation transformer section	15 kVA, 13.5 kW
PW9355-15-64	3-high: UPS with two battery sections	15 kVA, 13.5 kW

EBM	Description
EBM-64	2-high: two battery sections
EBM-96	3-high: three battery sections

Table 10. Dimensions and Weights

	Dimensions (H × W × D)	Weight
2-High UPS	32.2" × 12" × 33.5" (81 × 30 × 85 cm)	381 lb (173 kg)
3-High UPS-32	47.8" × 12" × 33.5" (121.5 × 30 × 85 cm)	587 lb (266 kg)
3-High UPS-64	47.8" × 12" × 33.5" (121.5 × 30 × 85 cm)	619 lb (281 kg)
2-High EBM	32.2" × 12" × 30.3" (81 × 30 × 77 cm)	480 lb (218 kg)
3-High EBM	47.8" × 12" × 30.3" (121.5 × 30 × 77 cm)	710 lb (322 kg)

Table 11. Environmental and Safety Specifications

Operating Temperature	10°C to 40°C (50°F to 104°F) Optimal battery performance: 25°C (77°F)
Transit Temperature	-25°C to 55°C (-13°F to 131°F)
Storage Temperature	0°C to 25°C (32°F to 77°F) Recommended battery storage: 15°C to 25°C (59°F to 77°F)
Ventilation	Front air intake, forced air, two fans, positive pressurization, temperature UPS-monitored
Altitude	9,843 ft (3,000m) operating without derating 32,810 ft (10,000m) during transportation
Relative Humidity	5–95% noncondensing
Audible Noise	<56 dBA at 1 meter distance, typical loads <62 dBA for heavy load, high ambient or high altitude, on battery
Surge Suppression	ANSI C62.41 Category B3
Safety Conformance	NOM-019-SCFI, UL 1778, CSA C22.2, No. 107.3; EN 55022 Class A (CISPR22 Class A) and IEC 60950; IEC 62040-1-1
Agency Markings	UL, cUL, CE (pending)
EMC (Class A)	IEC 62040-2, FCC Part 15, ICES-003

Table 12. Technical Specifications

Technology	Online, double-conversion topology with static bypass switch and 3-position maintenance bypass switch. Frequency independent operation.
Input Voltage Range	75/130–144/249 Vac per phase
Input Power Factor	>0.99 at full load nominal line conditions
Input Rated Voltage	120/208 or 127/220 Vac three-phase
Isolation Transformer Input Voltage Range	480V or 600V $\pm 20\%$ 60 Hz only
Input Frequency Range	45–65 Hz
Input Rated Frequency	50/60-Hz selectable, auto-configuring
Output Voltage Regulation	$\pm 1\%$ static, Phase to Neutral $\pm 2\%$ static, Phase to Phase $\pm 5\%$ dynamic at 100% resistive load change Response time <1 ms
Output Voltage Distortion	<2% THD linear load <5% THD non-linear load
Output Frequency	50/60-Hz selectable or auto-configuring
Output Frequency Regulation	Synchronization to line
Output Overload	101–110% for 10 minutes 111–125% for 60 seconds 126–149% for 5 seconds >150% for 300 milliseconds

Table 13. Model Specifications

10 kVA Model				
Output Voltage (Line–Line)	208	208	208	220
Output Voltage (Line–Neutral)	120	120	120	127
Input Voltage	208	480 (with input isolation transformer)	600V (with input isolation transformer)	220
Input Current	32.2A	16A	13.3A	30.5A
Output Current	27.8A	27.8A	27.8A	26.2A
Output kVA	10	10	10	10
Output kW	9	9	9	9
Efficiency (Minimum)	89%	83%	83%	89%
Heat Rejection [BTU/hr (kg-cal/hr)]	3798 (956)	6294 (1585)	6294 (1585)	3798 (956)
15 kVA Model				
Output Voltage (Line–Line)	208	208	208	220
Output Voltage (Line–Neutral)	120	120	120	127
Input Voltage	208	480 (with input isolation transformer)	600 (with input isolation transformer)	220
Input Current	48A	24A	20A	45.7A
Output Current	41.6A	41.6A	41.6A	39.4A
Output kVA	15	15	15	15
Output kW	13.5	13.5	13.5	13.5
Efficiency (Minimum)	90%	85%	85%	90%
Heat Rejection [BTU/hr (kg-cal/hr)]	5122 (1290)	8134 (2048)	8134 (2048)	5122 (1290)

Table 14. Battery Specifications

Battery Type	9 Ah sealed, valve-regulated lead acid (VRLA), maintenance-free, minimum 3-year float service life at 25°C (77°F), voltage 192 Vdc (96 cells per string)
Number of Strings	Maximum of 22 strings per full configuration, including UPS batteries (4 EBM-64 cabinets or 3 EBM-96 cabinets, plus UPS batteries) UPS-32: 2 strings; UPS-64: 4 strings EBM-64: 4 strings; EBM-96: 6 strings
Battery Replacement	Must be replaced by a qualified service technician
Charger	Service configurable 0.5–34A per string, with overall maximum of 34A (limited by input current). Default: 3.4A per string
Charging	Internal battery: approximately 3 hours to 80% usable capacity at nominal line voltage after full load discharge External battery: no more than 10x discharge time to 90% usable capacity at nominal line voltage after full load discharge
Start-on-Battery	Allows start of UPS without utility input
Performance	ABM technology increases battery service life, optimizes recharge time, and provides a warning before the end of useful battery life
Protection	Extended Battery Module output protected by 100A circuit breaker

Table 15. Battery Runtimes (in Minutes) at Full Load

2-High Cabinets					
Load	32 Internal UPS Batteries	(1) EBM-64	(2) EBM-64	(3) EBM-64	(4) EBM-64
15 kVA/13.5 kW	4	23	43	65	88
10 kVA/9 kW	8	37	69	106	144
3-High Cabinets					
Load	64 Internal UPS Batteries	(1) EBM-96	(2) EBM-96	(3) EBM-96	
15 kVA/13.5 kW	13	43	76	113	
10 kVA/9 kW	22	69	124	184	





NOTE Battery times are approximate and vary depending on the load configuration and battery charge.


Chapter 12 Troubleshooting

The Powerware 9355 is designed for durable, automatic operation and also alerts you whenever potential operating problems may occur. Usually the alarms shown by the control panel do not mean that the output power is affected. Instead, they are preventive alarms intended to alert the user. Use the following troubleshooting chart to determine the UPS alarm condition.

Typical Alarms and Conditions

The following table describes typical alarms and conditions; check the Event Log through the control panel for a list of active alarms. If an alarm appears with a service code, please contact the Help Desk (see page 89).

Alarm or Condition	Possible Cause	Action
On Battery  LED is on. 1 beep every second.	A utility failure has occurred and the UPS is in Battery mode.	The UPS is powering the equipment with battery power. Prepare your equipment for shutdown.
Battery Low  LED is on. Continuous beep for 10 seconds.	The battery is running low.	Five minutes or less of battery power remains (depending on load configuration and battery charge). Save your work and turn off your equipment. When utility power is restored, the UPS restarts automatically, provides power to the load, and charges the battery.
Battery Breaker  LED is on. 1 beep every second.	The UPS does not recognize the internal batteries.	Verify the battery circuit breaker is in the ON position. If the condition persists, contact your service representative.
Overload  LED is on. 1 beep every second.	Power requirements exceed the UPS capacity (greater than 100% of nominal; see page 83 for specific output overload ranges).	Remove some of the equipment from the UPS. The UPS continues to operate, but may switch to Bypass mode if the load increases. The alarm resets when the condition becomes inactive.

Alarm or Condition	Possible Cause	Action
Overtemperature  LED is on. 1 beep every second.	UPS internal temperature is too high or the fan has failed.	Turn the maintenance bypass switch to the SERVICE position. Otherwise, shut down the UPS. Clear vents and remove any heat sources. Allow the UPS to cool. Ensure the airflow around the UPS is not restricted. If the alarm disappears, turn the maintenance bypass switch back to the UPS position. If the condition persists, contact your service representative.
Battery test failed	The batteries need service.	Contact your service representative.
The UPS does not start.	The main utility breaker is off.	Verify that the main utility breaker is on.
	If an optional isolation transformer is installed, the input circuit breaker is off.	Verify that the isolation transformer input circuit breaker is on.
Power is not available to the UPS output.	The Remote Emergency Power-off switch is active or the REPO connector is missing.	Reset the REPO switch and restart the UPS. Verify that the REPO connector is present.
	The UPS is in Standby mode.	Supply power to the connected equipment: Press any button on the front panel display to activate the menu options. Press the ↑ button on the front panel display and then press the → button to select the TURN UPS ON/OFF menu. Select the ON option. Press and hold the ← button for three seconds, until the UPS stops beeping.
The UPS does not provide the expected backup time.	The batteries need charging or service.	Apply utility power for 48 hours to charge the batteries. If the condition persists, contact your service representative.
	Battery circuit breakers are in the OFF position.	Switch all battery circuit breakers to the ON position.

Silencing the Alarm

Before silencing an alarm, check the alarm condition and perform the applicable action to resolve the condition.

Press any button on the front panel display to silence the alarm. If the alarm status changes, the alarm beeps again, overriding the previous alarm silencing.

Service and Support

If you have any questions or problems with the UPS, call your **Local Distributor** or the **Help Desk** at one of the following telephone numbers and ask for a UPS technical representative.

United States: **1-800-843-9433** or **1-919-870-3028**

Canada: **1-800-461-9166 ext 260**

All other countries: **Call your local service representative**

Please have the following information ready when you call for service:

- Model number
- Serial number
- Firmware version number
- Date of failure or problem
- Symptoms of failure or problem
- Customer return address and contact information

Chapter 13 Limited Warranty

WARRANTOR: The warrantor for the limited warranties set forth herein is Eaton Power Quality Corporation, a Delaware Corporation (“Eaton”).

LIMITED WARRANTY: This limited warranty (this “Warranty”) applies only to the original end-user (the “End-User”) of the Powerware 3 Phase UPS Products (the “Product”) and cannot be transferred. This Warranty applies even in the event that the Product is initially sold by Eaton for resale to an End-User.

LIMITED WARRANTY PERIOD: The period covered by this Warranty for Product installed [and currently located] in the fifty (50) United States and the District of Columbia is twelve (12) months from the date of Product start-up or eighteen (18) months from date of Product shipment, whichever occurs first. The period covered by this Warranty for Product installed [and currently located] outside of the fifty (50) United States and the District of Columbia is twelve (12) months from the date of Product start-up or eighteen (18) months from date of Product shipment, whichever occurs first.

WHAT THIS LIMITED WARRANTY COVERS: The warrantor warrants that the Powerware three-phase UPS electronics, Eaton-built accessories, and Powerware-built battery cabinets, (individually and collectively, the “Warranted Items”) are free from defects in material and workmanship. If, in the opinion of Eaton, a Warranted Item is defective and the defect is within the terms of this Warranty, Eaton’s sole obligation will be to repair or replace such defective item (including by providing service, parts and labor, as applicable), at the option of Eaton. The Warranted Item will be repaired or replaced onsite at the End-User’s location or such other location as determined by Eaton. Any parts that are replaced may be new or reconditioned. All parts replaced by Eaton shall become the property of Eaton.

WHAT THIS LIMITED WARRANTY DOES NOT COVER: This Warranty does not cover any defects or damages caused by: (a) failure to properly store the Product before installation, including the “trickle charge” of batteries no later than the date indicated on the packaging; (b) shipping and delivery of the Product if shipping is FOB Factory; (c) neglect, accident, abuse, misuse, misapplication, incorrect installation; (d) repair or alteration, not authorized in writing by Eaton personnel or performed by an authorized Eaton Customer Service Engineer or Agent; or (e) improper testing, operation, maintenance, adjustment, or any modification of any kind not authorized in writing by Eaton personnel or performed by an authorized Eaton Customer Service Engineer or Agent.

This Warranty is not valid: (a) unless an authorized Eaton Customer Service Engineer (in USA) or Agent (outside of USA) performs start-up and commissioning of the Product; (b) if the Product is moved to a new location by someone other than an authorized Eaton Customer Service Engineer (in USA) or Agent (outside of USA); or (c) if the Product’s serial numbers have been removed or are illegible. Any Warranted Items repaired or replaced pursuant to this Warranty will be warranted for the remaining portion of the original Warranty subject to all the terms thereof. Labor warranty is not provided for Product located outside of the fifty (50) United States or the District of Columbia.

Any equipment, parts or materials included in the Product and not manufactured by Eaton are warranted solely by the manufacturer of such equipment, parts or materials and are not included as part of this warranty. Batteries are not warranted by Eaton.

THIS WARRANTY IS THE END-USER’S SOLE REMEDY AND IS EXPRESSLY IN LIEU OF, AND THERE ARE NO OTHER, EXPRESSED OR IMPLIED GUARANTEES OR WARRANTIES (INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED).

LIMITATION OF LIABILITY: In no event shall Eaton be liable for any indirect, incidental, special or consequential damages of any kind or type whatsoever, or based on any claim or cause of action, however denominated. Eaton shall not be responsible for failure to provide service or parts due to causes beyond Eaton’s reasonable control. In no case will Eaton’s liability under this Warranty exceed the replacement value of the Warranted Items.

END-USER'S OBLIGATIONS: In order to receive the benefits of this Warranty, the End-User must use the Product in a normal way; follow the Product's operators and maintenance manual; and protect against further damage to the Product if there is a covered defect.

OTHER LIMITATIONS: Eaton's obligations under this Warranty are expressly conditioned upon receipt by Eaton of all payments due to it (including interest charges, if any). During such time as Eaton has not received payment of any amount due to it for the Product, in accordance with the contract terms under which the Product is sold, Eaton shall have no obligation under this Warranty. Also during such time, the period of this Warranty shall continue to run and the expiration of this Warranty shall not be extended upon payment of any overdue or unpaid amounts.

COSTS NOT RELATED TO WARRANTY: The End-User shall be invoiced for, and shall pay for, all services not expressly provided for by the terms of this Warranty, including without limitation, site calls involving an inspection that determines no corrective maintenance is required. Any costs for replacement equipment, installation, materials, freight charges, travel expenses or labor of Eaton representatives outside the terms of this Warranty will be borne by the End-User.

OBTAINING WARRANTY SERVICE: In the USA, call the Eaton Customer Reliability Center 7x24 at 800-843-9433. Outside of the USA, call your local Eaton sales or service representative, or call the Eaton Customer Reliability Center in the USA at 919-870-3028. For comment or questions about this Limited Factory Warranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, North Carolina 27616 USA.